SANYO

# Service Technical Information

Color Video
Cassette Recorder

VHR-4100 Series
VHR-4200 Series
VHR-4300 Series
VHR-D4400 Series
VHR-D4500 Series
VHR-D4600 Series
VHR-D4700 Series
VHR-D4800 Series

VHS PAL HQ

## Basic Circuit Description

Contents

**1. Overview** . . . . . . . . . . . . . . . . . . . .1
**2. SSB System** . . . . . . . . . . . . . . . . . .2
2-1. Block Diagram of SSB System . . .2
2-2. Clock and Data Timing for SSB System . . . . . . . . . . . . . . . . . .3
2-3. Block 0 . . . . . . . . . . . . . . . . .5
2-4. Block 1 . . . . . . . . . . . . . . . . .7
2-5. Block 2 . . . . . . . . . . . . . . . . .8
2-6. Block 3 . . . . . . . . . . . . . . . . .9
2-7. Block 4 . . . . . . . . . . . . . . . .10
2-8. Block 5 . . . . . . . . . . . . . . . . . .11
2-9. Block 6 . . . . . . . . . . . . . . . . . .14
2-10. Block 7 . . . . . . . . . . . . . . . . .16
2-11 Block 8 . . . . . . . . . . . . . . . . .17
2-12. Block 9 . . . . . . . . . . . . . . . . .18
2-13. Block 10 and 11 . . . . . . . . . . .19
2-14. Outline of the SSB Monitor and the SV S.Data and ATR Data Monitor . . . . . . . . . . . . . . . .19
2-15. System-Control MPU (IC301) . .20
2-16. ATR (Auto Tracking) MPU (IC381: M50927 Series) . . . . . .28
2-17. Tape Remain Calculater MPU (IC304) . . . . . . . . . . . . . . . . .31
2-18. Timer and Tuning Control MPU (IC711) . . . . . . . . . . . . . . . .35
**3. Video Circuit System** . . . . . . . . . .42
3-1. Luminance Signal Processing IC (IC101: LA7322) . . . . . . . .42
3-2. Chroma Signal Processing Circuit 46
**4. Servo Circuit** . . . . . . . . . . . . . . .49

**DP Series**

REFERENCE No. WM-22342

# 1. OVERVIEW

This model contains a P88 mechanism which employs the full loading system. It has many salient features given below.

**(1) Non-use of Dedicated Power Switch**

(a) The power is automatically switched on when a tape is inserted, or the clock is set, or else a channel is adjusted.

(b) Even when the power is off with the tape loaded on, the power can be supplied to the equipment merely with the PLAY, F.F, or REWIND pushbutton, causing the equipment to start.

(c) The POWER switch also serves as a STOP button. When the STOP/POWER push button switch is pressed, the operation stops, but when it is pressed one more time, the power is turned off.

**(2) Non-Use of Timer Waiting Switch**

Timer waiting procedure was required on a conventional model hitherto available using the timer pushbutton switch at the end of reservation. This new model is automatically placed into the timer record waiting state if the reservation program has been put into the timer in advance.

**(3) Features of Full Loading Mechanism**

Hitherto, the tape was wound around the head drum only during the PLAY (RECORD) mode or the SEARCH mode of operation, but on this model, in every mode a full loading mechanism with the tape wound around the head drum is employed.

With the full loading mechanism adopted, the increased convenience of operation has significant been improved to eliminate the drawback of the VHS system.

(a) The mode shift time for quickening the time to cause an image to appear on the screen after pressing the PLAY button has been shortened to a considerable extent.

(b) When the same operating button (F.F or REWIND) is pressed during the fast forward mode or the rewind mode, an image is displayed on the screen, and the equipment is placed into the SEARCH mode for playback.

(c) The full loading mechanism dispenses with the need to add a special mechanism (such as a half-loading mechanism) and simplifies the design of the entire mechanism which hitherto made the mechanism extremely complicated and voluminous since the VISS/VASS functions and a realtime counter had to be designed in.

(d) On the new model, the high-speed VISS/VASS has now been made possible, including the quickening of the time from the detection of a VISS/VASS search signal till the display of an image on screen, and new functions such as "GO TO" for setting the playback start time.

**(4) SSB System (System Control)**

Using one common serial bus line, the SSB system sends and receives data at the same clock timing and on an time-sharing basis with the system between microcomputers such as the tape remaining calculation MPU the digital memory control MPU according to the functions of each model, in addition to the timer/tuning control MPU. This SSB system is designed around the system control MPU.

(a) Connection between the system control MPU and each microcomputer is made by use of one and the same clock (SCK) and one bus line (SDA) for simplification of wiring.

(b) A VTR condition can be checked by observing serial data on the SSB monitor set (Jig No. VHJ-0055) so that the cause can be easily found in the event of a trouble with a microcomputer.

(c) Mutual control of each microcomputer can be made by the common bus line, and service improvement is realized through standardization of microcomputers used on each model.

**(5) Features of Video Circuit**

The procedure for processing the VHS (HQ) type luminance signal and the chroma signal is unchanged as before.

(a) The luminance signal processing circuit of all models incorporates a noise canceller (including DOC offset) using a CCD 1H delay line for radical improvement on signal-to-noise ratio.

(b) The white/dark clip of the luminance signal is designed to be adjustment free.

(c) On some models having a digital memory mounted in, the digital noise reduction (DNR) circuit is provided to realize further image improvement.

**(6) Features of Servo Circuit**

The digital control method using the digital servo IC and the servo amplifier IC remains unchanged as in conventional systems hitherto available.

(a) The model having an ATR (auto tracking) mounted in makes use of an ATR microcomputer in the system control for more dependable automatic tracking control function through digital operation control. ATR data is sent to the digital servo IC via a system control microcomputer to execute tracking delay processing within the servo IC.

(b) The control signal DC record circuit, which is indispensable to the VISS/VASS and linear counter, is designed in the servo amplifier IC.

This manual describes the SSB system of the control system, which represents the most outstanding feature of this equipment.

## 2. SSB SYSTEM

- The SSB system is the abbreviation of the Serial Bus line system.
- The SSB signal consists of two types of signal below.

  [SCK]

  The clock signal to be output from the system control MPU according to the timing chart.

  [SDA]

  This is a bidirectional serial data line for data transfer on 12 bands (8 bit, 0 – 11 blocks).
- The SSB system is designed around the system control MPU. It makes system control of data among timer/tuning control MPU, tape remaining calculation MPU, and digital memory control MPU using a common bus line at one and the same clock timing and on a time sharing basis.
- It offers the following advantages over the conventional system which individually controls the microcomputer of each circuit with the signal from the system control MPU.
  1. Makes possible model design meeting the requirements for new functions using bidirectional serial data.
  2. Mutual control between microcomputers realizes microcomputer standardization with use of a common bus line.
  3. Serial data observable enables a check on the VTR operation status.
  4. Each microcomputer is controlled by one and the same clock for definite video system control.
  5. Number of input and output terminals between the system control MPU and each microcomputer can be reduced for increased efficiency of the system control MPU terminal function.

### 2-1. Block Diagram of SSB System

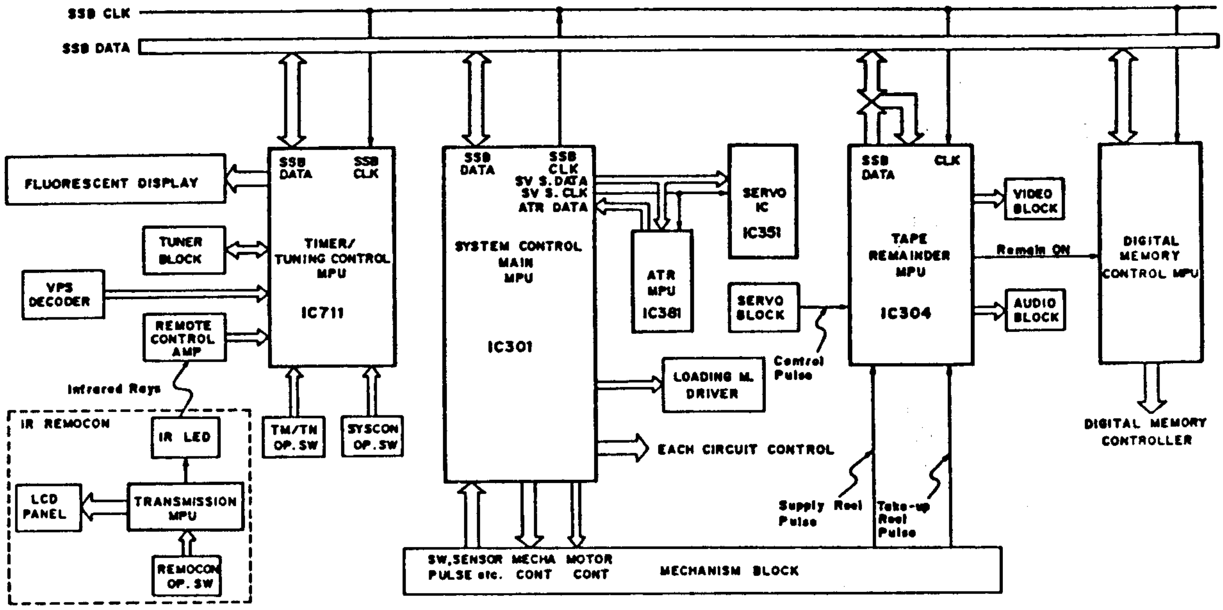

SSB CLK
SSB DATA
FLUORESCENT DISPLAY
TUNER BLOCK
VPS DECODER
REMOTE CONTROL AMP
Infrared Rays
IR REMOCON
IR LED
LCD PANEL
TRANSMISSION MPU
REMOCON OP. SW
SSB DATA
SSB CLK
TIMER/ TUNING CONTROL MPU
IC711
TM/TN OP. SW
SYSCON OP. SW
SSB DATA
SSB CLK
SV S. DATA
SV S. CLK
ATR DATA
SYSTEM CONTROL MAIN MPU
IC301
SERVO IC
IC351
ATR MPU
IC381
SERVO BLOCK
LOADING M. DRIVER
Control Pulse
EACH CIRCUIT CONTROL
Supply Reel Pulse
Take-up Reel Pulse
SSB DATA
CLK
TAPE REMAINDER MPU
IC304
VIDEO BLOCK
Remain ON
AUDIO BLOCK
DIGITAL MEMORY CONTROL MPU
DIGITAL MEMORY CONTROLLER
SW, SENSOR PULSE etc.
MECHA CONT
MOTOR CONT
MECHANISM BLOCK

Fig. 2-1-1. SSB System Block Diagram

## 2-2. Clock Data Timing for SSB System

### 2-2-1. SSB Data Cycle

- The SSB system forms one data cycle with twelve blocks of bytes 0 – 11.

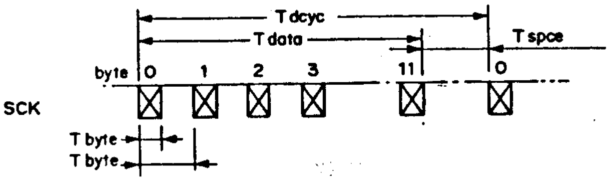

Tdcyc
T data
T spce
byte 0 1 2 3 11 0
SCK
T byte
T byte

Fig. 2-2-1

### 2-2-2. Byte (Block) Cycle

- Each block consists of one byte cycle of 8 bits 0 – 7.

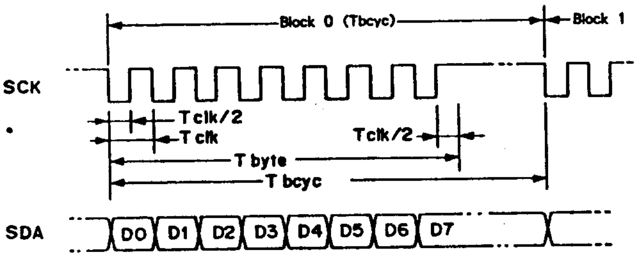

Block 0 (Tbcyc)
Block 1
SCK
Tclk/2
T clk
Tclk/2
T byte
T bcyc
SDA
D0 D1 D2 D3 D4 D5 D6 D7

Fig. 2-2-2

### 2-2-3. Clock (Bit) Cycle

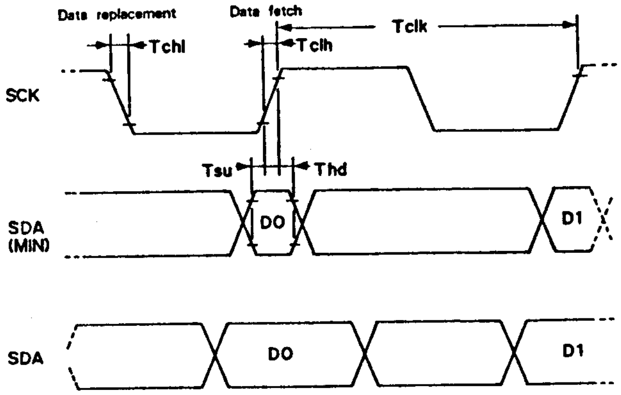

Data replacement
Data fetch
Tclk
Tchl
Tclh
SCK
Tsu
Thd
SDA (MIN)
D0
D1
SDA
D0
D1

Fig. 2-2-3

### 2-2-4. SSB Timing Characteristics

| Characteristic | Symbol | MAX | TYP | MIN | Unit |
|---|---|---|---|---|---|
| Data Cycle Time | Tdcyc | 16.896 | 15.360 | 13.824 | ms |
| Data Area Width | Tdata | 12.531 | 11.392 | 10.253 | ms |
| Byte Width | Tbyte | 281.6 | 128 | 115.2 | µ s |
| Byte Cycle Time | Tbcyc | 1126.4 | 1024 | 921.6 | µ s |
| Clock-pulse Cycle Time | Tclk | 35.2 | 16 | 14.4 | µ s |
| Clock-pulse Rise Time | Tclh | 3 | – | – | µ s |
| Clock-pulse Fall Time | Tchl | 3 | – | – | µ s |
| Data Setup Time | Tsu | – | – | 1 | µ s |
| Data Hold Time | Thd | – | – | 1 | µ s |
| Data Space Width | Tspce | – | – | 3.571 | ms |

Table 2-2-1

**(5) Data Signal of each Blocks 0 – 11**

| SSB DATA BLOCK NO. | BLOCK 0 | | | | | | | | BLOCK 1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE | GENERALLY TIMER/TUNING CONTROL MPU | | | | | | | | SYSTEM CONTROL MPU | | | | | | | |
| BIT NO. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SIGNAL NAME | KEY | | | | | | | | MODE | | | | | MODE TRANS | HOLD | POWER ON |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | 4 | | | |
| REF. ITEM | D3~0 (0~F) | | | | D7~4 (0~F) | | | | OPERATION MODE | | | | | | | |

| SSB DATA BLOCK NO. | BLOCK 2 | | | | | | | | BLOCK 3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE | SYSTEM CONTROL MPU | | | | | | | | TIMER/TUNING CONTROL MPU | | | | | | | |
| BIT NO. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SIGNAL NAME | PB/REC SPEED | | CTL PULSE LACK | E. P SW | S-VHS MODE | DEW | PLAY BACK | TIMER CANCEL | TIMER PRO-GRAM | QSR | EXEC TIME | PRO-GRAM MODE | OSD ON | VCR/ TV | S-VHS SW | TAPE T-160 SW |
| | 0 | 1 | | | | | | | | | | | | | | |
| REF. ITEM | EP, LP, SP | | | | | | TAPE BEGIN/ END | CAUTION FLASH | D0-D2 timer status selection | | | | | | | |

| SSB DATA BLOCK NO. | BLOCK 4 | | | | | | | | BLOCK 5 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE | EACH MPU COMMON | | | | | | | | EACH MPU COMMON | | | | | | | |
| BIT NO. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SIGNAL NAME | USE 10KEY | DATA SOURCE A | | | DATA SOURCE B | | GRAPHIC SOURCE | | DISP DATA A | | | | GRAPHIC DATA | | | |
| | | 0 | 1 | 2 | 0 | 1 | 0 | 1 | A0 | A1 | A2 | A3 | 0 | 1 | 2 | 3 |
| REF. ITEM | | FLD upper stage display MPU selection | | | FLD lower stage display MPU selection | | FLD upper stage TRACKING display | | FLD upper stage display DATA | | | | FLD upper stage TRACKING display DATA | | | |

| SSB DATA BLOCK NO. | BLOCK 6 | | | | | | | | BLOCK 7 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE | EACH MPU COMMON | | | | | | | | TIMER/TUNING CONTROL MPU | | | | | | | |
| BIT NO. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SIGNAL NAME | DISP DATA B | | | | | | | | CH | | | | STATION | TUNE PRO-CESS | | PRESET |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | | | | |
| REF. ITEM | FLD lower stage display DATA | | | | | | | | CHANNEL selection | | | | | | | |

| SSB DATA BLOCK NO. | BLOCK 8 | | | | | | | | BLOCK 9 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE | TIMER/TUNING CONTROL MPU | | | | | | | | D/M COTROL MPU AND SYSTEM CONTROL MPU | | | | | | | |
| BIT NO. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SIGNAL NAME | INPUT SELECT SW | | AUDIO OUT SELECT SW | | EXT1/ EXT2 SW | MIX PB SW | | | D/M MODE | | | | | DNR | POSITION INIT | MEMORY INHIBIT |
| | 0 | 1 | 2 | 3 | | | | | 0 | 1 | 2 | 3 | 4 | | | |
| REF. ITEM | | | | | | | | | | | | | | | | |

| SSB DATA BLOCK NO. | BLOCK 10 | | | | | | | | BLOCK 11 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE | BLANK | | | | | | | | BLANK | | | | | | | |
| BIT NO. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| SIGNAL NAME | BLANK | | | | | | | | FREE AREA | | | | | | | |
| REF. ITEM | | | | | | | | | | | | | | | | |

**Table 2-2-2**

## 2-3. BLOCK 0

This block represents the operating key data signal. This is mainly output from the TIMER/TUNING CONTROL MPU.
But on multi-function models, the key operating signal may sometimes be fed from other microcomputer.

### 2-3-1. Key 0 – 7

(1) The microcomputer which outputs KEY 0 – 7 does this output operation while making arbitration (*) shown below.

- When KEY data is output, enter the data at that time, but if the data fails to agree with the previously output data even once, "NO KEY" signal is output when the next block 0 has come, thereby indicating that the KEY data output was not possible. In this case, the KEY output is not made.

**[Arbitration algorithm]**

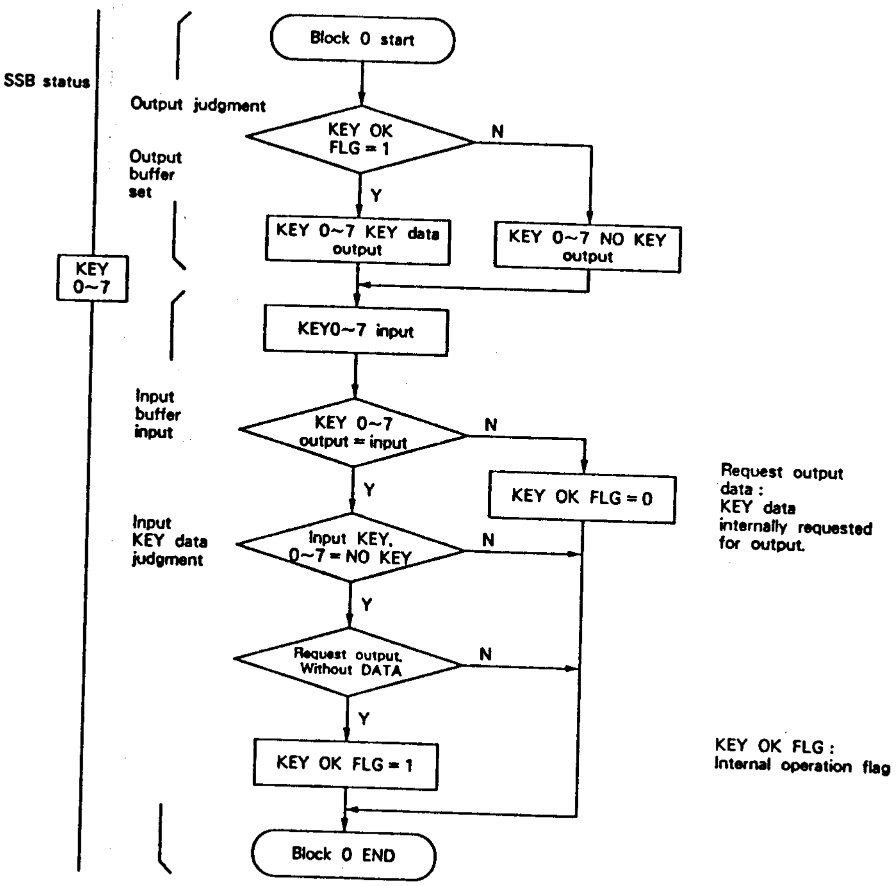

SSB status
KEY 0~7
Output judgment
Output buffer set
Input buffer input
Input KEY data judgment
Block 0 start
KEY OK FLG = 1
N
Y
KEY 0~7 KEY data output
KEY 0~7 NO KEY output
KEY0~7 input
KEY 0~7 output = input
N
Y
KEY OK FLG = 0
Input KEY, 0~7 = NO KEY
N
Y
Request output. Without DATA
N
Y
KEY OK FLG = 1
Block 0 END
Request output data : KEY data internally requested for output.
KEY OK FLG : Internal operation flag

Fig. 2-3-1

**Note * : Arbitration**
The term "arbitration" refers an arbitrating action. That is, when data is entered simultaneously from two or more different microcomputers, the data bus is once placed into the initial state to avoid disorder of signal contents for acceptance of new data entry.
In other words, when data A is sent to the data bus from the microcomputer A, and data B is sent out of the microcomputer B at the same time, data A and B are made invalid with the data bus changed into data C (NO KEY).

(The microcomputer A sends data A out and fetches the data A once again in the microcomputer A. It then compares the contents, and if the contents are same, data is sent out to data bus directly, but if contents differ (that is, data A exists together with data B), data A and data B are made invalid. But it becomes valid when data B has been sent out upon recognition of data A.)

(2) The microcomputer which inputs KEY 0 − 7 verifies the coincidence of input data twice and takes it as confirmed data. If data differing from that currently confirmed is entered twice consecutively, the verifying KEY is judged to have been released. For further details, refer to the example of operation below.

- Example of KEY Entry and Release Operation

−B−A−A−A−C−A−A−B−C−D−D−D−

Verifying KEY data |—— A KEY ——| NO KEY |— D KEY

(3) KEY depression (front SW and remote control SW) has to be made at least three times, and data can be output while each key is being held.

(4) The KEY code which is automatically sent out by the microcomputer should be output at least five times.

(5) Front KEY takes precedence over the remote control KEY.

(6) KEY data (D0 − D7) with bits 0 − 7 is shown below.

KEY data is in combination of the first half 4 bits of D3-0 and the last half 4 bits of D7-4 as given in the table below.

| | D3~0 0 | D3~0 1 | D3~0 2 | D3~0 3 | D3~0 4 | D3~0 5 | D3~0 6 | D3~0 7 | D3~0 8 | D3~0 9 | D3~0 A | D3~0 B | D3~0 C | D3~0 D | D3~0 E | D3~0 F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D7~4 0 | KE RELEASE | CH UP | CH DOWN | AUDIO SELECT | 1/ POS 1 | 2/ POS 2 | 3/ POS 3 | 4/ POS 4 | VCR/ TV | VOL UP | VOL DOWN | QUICK | 5/ POS 5 | 6/ POS 6 | 7/ POS 7 | 8/ POS 8 |
| D7~4 1 | STOP | PAUSE /STILL | REW | FF | PLAY | REC | REW PLAY | F • ADV | REVERS E PLAY | SERCH | SLOW | 1/5 SLOW | 9/ POS 9 | 0/ POS 10 | AV | AUTO TRACK |
| D7~4 2 | | | | | | | | | | | | | | | | |
| D7~4 3 | | | | | | | | | | | | | | | | |
| D7~4 4 | POS 11 | POS 12 | MEMORY CALL | COUNT. MEMORY | COUNT. RESET | C • DISP LAY | RECALL /PROG. | MODE + | MODE − | | CANCEL | OK | OSD DISP. | TRACKI NG + | TRACKI NG − | VPS |
| D7~4 5 | SPECIAL | PIP | INSERT | MEMORY STILL | MARK | | MEMORY ROCK | MULTI STROBE | ZOOM | ART | STROBE | DICIT. RELEAS | CH SCAN | PRE MULTI | TAPE SPEED | DNR |
| D7~4 6 | | | | | | | | | | | | | | | | |
| D7~4 7 | | | | | | | | | | | | | | | | |
| D7~4 8 | EJECT | A.DUB | REW EJECT | REW REC | CLOCK SET | | | | | | S − VHS AUT/ MN | | | | | |
| D7~4 9 | | | | | POS 13 | POS 14 | POS 15 | POS 16 | BAND | MEMORY (CH) | TUNING UP | TUNING DOWN | FT UP | FT DOWN | PRESET | |
| D7~4 A | | | | | | | | | | | | | | | | |
| D7~4 B | | | | | | | | | | | | | | | | |
| D7~4 C | | | T.REC PAUSE | | | | | | VISS | VASS | GO TO | SET ON | SET OFF | SP | LP | EP |
| D7~4 D | SPECIAL 0 | SPECIAL 1 | SPECIAL 2 | SPECIAL 3 | SPECIAL 4 | SPECIAL 5 | SPECIAL 6 | SPECIAL 7 | SPECIAL 8 | SPECIAL 9 | SPECIAL 10 | SPECIAL 11 | SPECIAL 12 | SPECIAL 13 | SPECIAL 14 | SPECIAL 15 |
| D7~4 E | | | | | | | | | | | | | | | | |
| D7~4 F | | | | | | | | | | | | | | | | NO KEY |

**Table 2-3-1**

## 2-4. BLOCK 1

This is the VTR operation mode data signal. The signal is output from the system control MPU.

### 2-4-1. Mode 0 – 4

1. This block in combination with HOLD (D6) indicates the MODE status of the system.
2. When the MODE changes, its destination MODE is indicated.
3. The display corresponding to button input is indicated.

4. Special MODES

- TIMER STAND-BY

When a shift is made to POWER OFF with bit 0 (TIMER PROGRAM) of block 3 "L" level and bit 2 (EXEC TIME) "H" level, and also with the system control ready for recording, the system control is placed into the TIMER STAND-BY mode, and the "TIMER STAND-BY" is output to MODE 0 – 4.

The TIMER microcomputer verifies this mode and causes the TIMER mark to light.

| Bit<br>Mode | MODE 4<br>D4 | MODE 3<br>D3 | MODE 2<br>D2 | MODE 1<br>D1 | MODE 0<br>D0 |
|---|---|---|---|---|---|
| CST OUT | H | H | H | H | H |
| A.DUB PAUSE | H | H | H | H | L |
| REW | H | H | H | L | H |
| FF | H | H | H | L | L |
| FRAME ADVANCE | H | H | L | H | H |
| STILL | H | H | L | H | L |
| REC PAUSE | H | H | L | L | H |
| REC | H | H | L | L | L |
| PLAY | H | L | H | H | H |
| CUE | H | L | H | H | L |
| REVIEW | H | L | H | L | H |
| SLOW | H | L | H | L | L |
| QUICK (× 2S) | H | L | L | H | H |
| A.DUB | H | L | L | H | L |
| STAND – BY | H | L | L | L | H |
| STOP | H | L | L | L | L |
| TIMER STAND – BY | L | H | H | H | H |
| CST OUT TM ST – BY | L | H | H | H | L |
| REW SEARCH | L | H | H | L | H |
| FF SEARCH | L | H | H | L | L |
| VIDEO INSERT | L | H | L | H | H |
| VIDEO INSERT PAUSE | L | H | L | H | L |
| TIMER REC PAUSE | L | H | L | L | H |
| TIMER REC | L | H | L | L | L |
|  | L | L | H | H | H |
| HIGH SPEED CUE | L | L | H | H | L |
| HIGH SPEED REVIEW | L | L | H | L | H |
| REW EJECT | L | L | H | L | L |
| REW PLAY | L | L | L | H | H |
| REW REC | L | L | L | H | L |
|  | L | L | L | L | H |
| INITIAL | L | L | L | L | L |

**Table 2-4-1**

- TIMER REC

1. System control shifts to the TIMER REC mode and causes the "Timer REC" to be output to Mode 0 – 4 when EXEC TIME "L" of bit 2 of block 3 is entered from the TIMER STAND-BY above. (TIMER REC start.)
2. System control shifts to the TIMER REC mode without going through POWER OFF when the POWER SW is entered from KEY 0 – 7 of block 0 during an entry of EXEC TIME "L" of bit 2 of block 3 and causes "TIMER REC" to be output to MODE 0 – 4. (Timer REC is enabled upon pressing the POWER KEY after going into the TIMER REC reservation time.)

- TIMER REC PAUSE

System control shifts to the TIMER REC PAUSE mode and outputs "TIMER REC PAUSE" to MODE 0 – 4 when the "TIMER REC PAUSE" KEY is entered from KEY 0 – 7 of block 0 in the above TIMER REC mode.

But when the "PAUSE KEY" is entered from KEY 0 – 7 in the TIMER REC mode, the system control shifts to the REC PAUSE MODE and outputs "REC PAUSE" to MODE 0 – 4.

### 2-4-2. MODE TRANS (*)

- The MODE change at the time of a MODE shift is indicated.

|  | MD. TRS (D5) |
|---|---|
| STLD OR PAUSE MODE | H |
| PROCESS OF MODE | L |

*This data may or may not be used depending upon the model.

**Table 2-4-2**

### 2-4-3. HOLD

- In case where a MODE change is being made, the transition state is indicated.
- This is used in combination with Mode 0 − 4.
- Method of Judging the Tape IN/OUT

  TAPE OUT : FUNC. 0 − 4 = CASSETE OUT
  POWER ON/OFF (*)
  TAPE IN : Besides above

| | HOLD D6 |
|---|---|
| SETTLED MODE | H |
| PROCESS OF MODE | L |

Table 2-4-3

*System control causes the corresponding Mode 0 − 4 = CASSETTE OUT POWER ON to be sent out upon reception of the EJECT key.

### 2-4-4. POWER ON

The set's power status is indicated.

| | PWR ON D7 |
|---|---|
| POWER OFF | H |
| POWER ON | L |

Table 2-4-4

## 2-5. BLOCK 2

This is a data signal for operation tape speed status, CTL signal presence or absence, E.P erase prevention switch status, DEW status, playback status, tape end cancel during the TIMER REC mode of operation, etc. This signal is output from the system control MPU.

### 2-5-1. PB/REC SPEED 0, 1

- This indicates the PB and REC TAPE SPEED.
- When it is desired to erase the display of the TAPE SPEED (when erasing the TAPE SPEED display in the case of 1 speed model and with the POWER OFF). "H, H" (display OFF) is output.

| | SPD1 D1 | SPD0 D0 |
|---|---|---|
| Display OFF | H | H |
| SP | H | L |
| LP | L | H |
| EP | L | L |

Table 2-5-1

### 2-5-2. CONTROL PULSE LACK

- When the CONTROL PULSE is absent for 0.5 second or longer, the level changes to "L".
- When CONTROL PULSE LACK = "L", BLUE BACK ON is made.

| | CTL L D2 |
|---|---|
| CTL PULSE EXIST | H |
| CTL PULSE LACK | L |

Table 2-5-2

### 2-5-3. E.P SW

- The status of erase prevention tab for the inserted cassette is indicated.

| | E P SW D3 |
|---|---|
| NO E P TAB | H |
| KEEP E P TAB | L |

Table 2-5-3

### 2-5-4. S-VHS MODE

- In the REC MODE, the result of judgment is output depending upon the status of front S-VHS SW (block3 D6) and S-VHS SW of the cassette.
- In the PLAY mode, the result of judgment made by the video circuit is output.

| | S MODE D4 |
|---|---|
| NORMAL VHS MODE | H |
| S − VHS MODE | L |

Table 2-5-4

### 2-5-5. DEW

- The dew status is indicated.

| | DEW D5 |
|---|---|
| NO DEW | H |
| DEW | L |

Table 2-5-5

### 2-5-6. PLAY BACK (TAPE BEGIN/END)

- "L" level when the PLAY BACK display is being shown on screen.
- "H" level in the EE mode.

| | PB D6 |
|---|---|
| EE | H |
| PLAY BACK | L |

Table 2-5-6

*This data may be used as TAPE BEGIN/END on some models.

### 2-5-7. TIMER CANCEL (CAUTION FLASH)

- The timer reservation is cancelled by making the voltage level "L" in the TIMER REC mode of operation. (This is output when the tape end comes during the TIMER REC mode of operation.)

| | T. CANS D7 |
|---|---|
| NO CANCEL | H |
| TIMER CANCEL | L |

Table 2-5-7

*This data may be used as "CAUTION FLASH" on some models.

## 2-6. BLOCK 3

This is a data signal for timer program status, on screen status, TV/VTR switchover status, S-VHS switch status, tape type for calculation of remaining tape length, etc. This is output from the TIMER/TUNING CONTROL MPU.

### 2-6-1. TIMER PROGRAM

- The level is made "L" when there is one or more TIMER reservation or QSR reservation.

| | T. PRG. D0 |
|---|---|
| NO TIMER PROGRAM | H |
| EXIST TIMER PROGRAM | L |

Table 2-6-1

### 2-6-2. QSR

- The level is made "L" during QSR reservation, QSR waiting, and QSR execution.

| | QSR D1 |
|---|---|
| NO QSR PROGRAM | H |
| EXIST QSR PROGRAM | L |

Table 2-6-2

### 2-6-3. EXEC TIME

- The level is made "L" when the current time is within either QSR or TIMER reservation time.

| | XEQ T. D2 |
|---|---|
| WAITING TIME | H |
| EXECUTE TIME | L |

Table 2-6-3

**< Supplement >**

Identification of TIMER status based on 3 bit information of TIMER PROGRAM, QSR and EXEC TIME.

| | EXEC T D2 | QSR D1 | T.PRG. D0 |
|---|---|---|---|
| Without reservation of timer QSR | H | H | H |
| With timer wating time | H | H | L |
| During QSR reservation | H | L | H |
| Within QSR waiting time | H | L | L |
| – | L | H | H |
| Within timer execution time | L | H | H |
| – | L | L | H |
| Within QSR execution time | L | L | L |

Table 2-6-4

### 2-6-4. PROGRAMING MODE

- The level is made "L" during TIMER reservation entry, including confirmation, correction, and time setting.

| | PRG. MO D3 |
|---|---|
| NOT PROGRAMING | H |
| PROGRAMING | L |

Table 2-6-5

### 2-6-5. OSD ON

- The level is made "L" when ON SCREEN characters are appearing on the screen. (This includes the blue back status.)

| | OSD ON D4 |
|---|---|
| OSD OFF | H |
| OSD ON | L |

Table 2-6-6

### 2-6-6. VCR/TV (TV MODE)

- VCR/TV switchover control signal.

| | ANT/V D5 |
|---|---|
| VCR | H |
| TV | L |

Table 2-6-7

### 2-6-7. S-VHS SW

- This sends data of front S-VHS SW out.

| | S-V SW D6 |
|---|---|
| NORMAL VHS | H |
| S-VHS | L |

Table 2-6-8

### 2-6-8. TAPE T-160 SW (NTSC Model Only)

- This is used for calculating the remaining tape length.

| | T－L SW D7 |
|---|---|
| ~T120 | H |
| T160 | L |

Table 2-6-9

## 2-7. BLOCK 4

This is the 10key operation mode status and the selection data of the data sending MPU for FLD display of the VTR. It is relevent for all MPUs depending on the mode. Displayed data signals, however, are sent by blocks 5 and 6.

### 2-7-1. USE 10-KEY

- Microcomputers other than the TIMER's cause "L" to be output to this bit when it has been placed into the MODE in which data is entered by using 10-KEY.
- The TIMER microcomputer does not cause data of CH No., etc. to be changed by using 10-KEY if this bit is "L".

| | USE 10 D0 |
|---|---|
| DON'T USE | H |
| USING | L |

Table 2-7-1

### 2-7-2. . DATA SOURCE A 0 – 2

- This is used for selection of the MPU that sends data of DISP DATA A 0 – 3.

| Data Sending Microcomputer | DSA 2 D3 | DSA 1 D2 | DSA 0 D1 |
|---|---|---|---|
| SYSCON | H | H | H |
| VISS/VASS | H | H | L |
| TAPE REMAINDER | H | L | H |
| ———— | H | L | L |
| ———— | L | H | H |
| ———— | L | H | L |
| ———— | L | L | H |
| CHANGE | L | L | L |

Table 2-7-2

### 2-7-3. DATA SOURCE B 0 – 1

- This is used for selection of the MPU that sends data of DISP DATA B 0 – 3.

| Data Sending Microcomputer | DSB 1 D5 | DSB 0 D4 |
|---|---|---|
| SYSCON | H | H |
| TAPE REMAINDER | H | L |
| ———— | L | H |
| CHANGE | L | L |

Table 2-7-3

### 2-7-4. GRAPHIC SOURCE 0 – 1

This is used for selection of the MPU that sends data of GRAPHIC DATA 0 – 3 out.

| Data Sending Microcomputer | GS 1 D7 | GS 0 D6 |
|---|---|---|
| SYSCON | H | H |
| ELECTRIC VOLUME | H | L |
| ———— | L | H |
| CHANGE | L | L |

Table 2-7-4

**[DISP DATA A]**
FLD upper stage section display data.

**[DISP DATA B]**
FLD lower stage section display data.

**[GRAPHIC DATA]**
FLD upper stage section display data. Display is made by switching over with DISP DATA A.(Mainly TRACKING data display.)

**[CHANGE Code Processing]**
The microcomputer (TIMER microcomputer) now displaying data is established the display (FLD and OSD) according to the DATA before the CHANGE during the CHANGE code entry ( one - time coincidence.)

## 2-8. BLOCK 5

This block is an FLD upper stage display data signal. 4 bits of D0 – D3 are VISS/VASS allied data, and other 4 bits of D4 – D7 are TRACKING graphic display data. The VISS/VASS and TRACKING can never be displayed simultaneously as they are switched over between them.

### 2-8-1. DISP DATA A 0 – 3 (D0 – D3)

- Data for DISPLAY of VISS and VASS, etc is sent out.
- At the time of entry
  - i) 8th time without header is ignored.
  - ii) The latter takes the precedence if there is a header in between.
- DISP DATA A is established with seven times of SSB data cycles as a complete cycle.

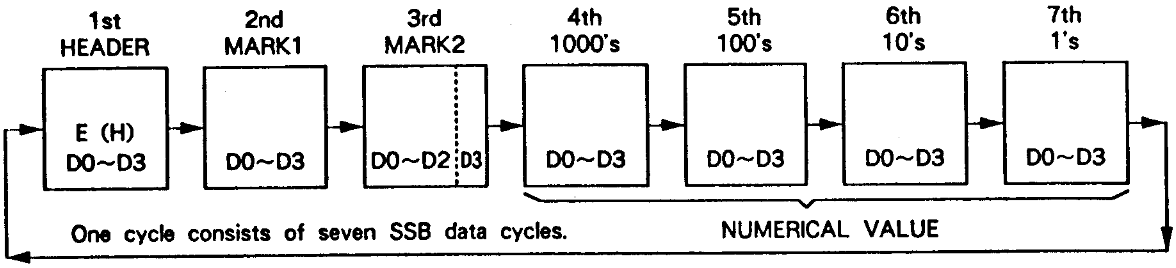

1st
HEADER
2nd
MARK1
3rd
MARK2
4th
1000's
5th
100's
6th
10's
7th
1's
E (H)
D0~D3
D0~D3
D0~D2
D3
D0~D3
D0~D3
D0~D3
D0~D3
One cycle consists of seven SSB data cycles.
NUMERICAL VALUE

Fig. 2-8-1

- D3 bit of MARK2 indicates MEMORY ON/OFF.
  ON – "L" OFF – "H"

| MARK1 | MARK2 | | NUMERICAL VALUE | D3 | D2 | D1 | D0 |
|---|---|---|---|---|---|---|---|
| | D3 | D2~D0 | | | | | |
| MARK BLANK | MEMORY | See separate figure attached. | BLANK | H | H | H | H |
| HEADER | | | HEADER | H | H | H | L |
| COUNTER GO – TO | | | S | H | H | L | H |
| INDEX | | | P | H | H | L | L |
| ADDRESS | | | C | H | L | H | H |
| MARK | | | – | H | L | H | L |
| ERASE | | | 9 | H | L | L | H |
| CALL | | | 8 | H | L | L | L |
| RENUMBER | | | 7 | L | H | H | H |
| REPEAT | | | 6 | L | H | H | L |
| TAPE SELECT | | | 5 | L | H | L | H |
| TRACKING | | | 4 | L | H | L | L |
| SPECIAL | | | 3 | L | L | H | H |
| | | | 2 | L | L | H | L |
| | | | 1 | L | L | L | H |
| | | | 0 | L | L | L | L |

Table 2-8-1

- Contents of 2nd MARK2 data corresponding to 1st MARK1 data.

| MARK1 | MARK2 | D2 | D1 | D0 | MARK1 | MARK2 | D2 | D1 | D0 |
|---|---|---|---|---|---|---|---|---|---|
| MARK BLANK | MARK BLANK | H | H | H | CALL |  | H | H | H |
|  | HEADER | H | H | L |  | HEADER | H | H | L |
|  | MARK BLANK | H | L | H |  |  | H | L | H |
|  | MARK BLANK | H | L | L |  |  | H | L | L |
|  | MARK BLANK | L | H | H |  |  | L | H | H |
|  | MARK BLANK | L | H | L |  |  | L | H | L |
|  | MARK BLANK | L | L | H |  | FLT and OSD | L | L | H |
|  | MARK BLANK | L | L | L |  | FLT | L | L | L |
| COUNTER GO－TO |  | H | H | H | RENUMBER |  | H | H | H |
|  | HEADER | H | H | L |  | HEADER | H | H | L |
|  |  | H | L | H |  |  | H | L | H |
|  |  | H | L | L |  |  | H | L | L |
|  | FIND | L | H | H |  |  | L | H | H |
|  | SCAN | L | H | L |  |  | L | H | L |
|  | STAND BY SET | L | L | H |  | MARK | L | L | H |
|  | STAND BY | L | L | L |  | SCAN | L | L | L |
| INDEX |  | H | H | H | REPEAT |  | H | H | H |
|  | HEADER | H | H | L |  | HEADER | H | H | L |
|  |  | H | L | H |  |  | H | L | H |
|  | MEMORY HOLD | H | L | L |  |  | H | L | L |
|  | FIND | L | H | H |  |  | L | H | H |
|  | SCAN | L | H | L |  |  | L | H | L |
|  | STAND BY SET | L | L | H |  | OPERATE | L | L | H |
|  | STAND BY | L | L | L |  | STAND BY | L | L | L |
| ADDRESS |  | H | H | H | TAPE SELECT |  | H | H | H |
|  | HEADER | H | H | L |  | HEADER | H | H | L |
|  | LINEAR TIME ADDRESS | H | L | H |  |  | H | L | H |
|  |  | H | L | L |  |  | H | L | L |
|  | FIND | L | H | H |  |  | L | H | H |
|  | SCAN | L | H | L |  |  | L | H | L |
|  | STAND BY SET | L | L | H |  |  | L | L | H |
|  | STAND BY | L | L | L |  |  | L | L | L |
| MARK |  | H | H | H | TRACKING |  | H | H | H |
|  | HEADER | H | H | L |  | HEADER | H | H | L |
|  |  | H | L | H |  |  | H | L | H |
|  |  | H | L | L |  |  | H | L | L |
|  |  | L | H | H |  |  | L | H | H |
|  |  | L | H | L |  |  | L | H | L |
|  | VASS | L | L | H |  |  | L | L | H |
|  | VISS | L | L | L |  |  | L | L | L |
| ERASE |  | H | H | H | SPECIAL |  | H | H | H |
|  | HEADER | H | H | L |  | HEADER | H | H | L |
|  |  | H | L | H |  |  | H | L | H |
|  |  | H | L | L |  |  | H | L | L |
|  |  | L | H | H |  |  | L | H | H |
|  |  | L | H | L |  |  | L | H | L |
|  | ERASE | L | L | H |  |  | L | L | H |
|  | SCAN | L | L | L |  |  | L | L | L |

**Table 2-8-2**

### 2-8-2. GRAPHIC DATA 0 – 3 (D4 – D7)

- Data for GRAPHICS is sent out.
- At the time of entry
  - i) 5th time without header is ignored.
  - ii) If a header exists in between, the latter one takes precedence.
- GRAPHIC DATA is established with six SSB data cycles as one cycle.

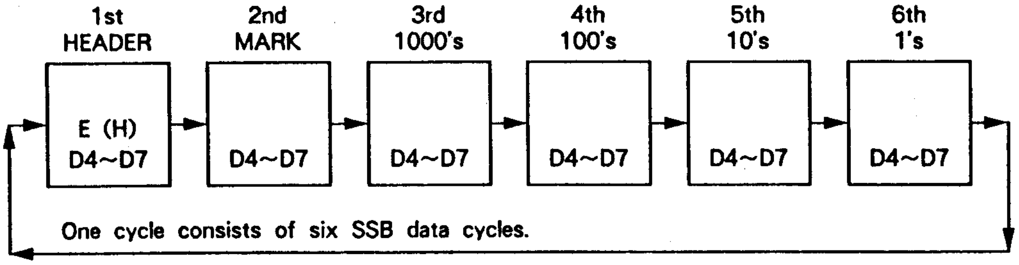

1st
HEADER
2nd
MARK
3rd
1000's
4th
100's
5th
10's
6th
1's
E (H)
D4~D7
D4~D7
D4~D7
D4~D7
D4~D7
D4~D7
One cycle consists of six SSB data cycles.

Fig. 2-8-2

| MARK | NUMERICAL VALUE | D7 | D6 | D5 | D4 |
|---|---|---|---|---|---|
| | BLANK | H | H | H | H |
| HEADER | HEADER | H | H | H | L |
| | S | H | H | L | H |
| | P | H | H | L | L |
| | C | H | L | H | H |
| | – | H | L | H | L |
| | 9 | H | L | L | H |
| | 8 | H | L | L | L |
| | 7 | L | H | H | H |
| | 6 | L | H | H | L |
| | 5 | L | H | L | H |
| ELECTRIC VOLUME | 4 | L | H | L | L |
| VARIABLE SLOW | 3 | L | L | H | H |
| INDEX REVERCE | 2 | L | L | H | L |
| INDEX FORWARD | 1 | L | L | L | H |
| TRACKING | 0 | L | L | L | L |

Table 2-8-3

## 2-9. BLOCK 6

This block is a signal for FLD lower stage display linear tape counter data and tape remaining length data (on models with the TAPE REMAIN function only).

### 2-9-1. DISP DATA B 0 – 7

- This block sends out linear counter data and TAPE REMAIN data.
- DISP DATA B is established with three times of SSB data cycle as a cycle.
- At the time of entry
  - i) 4th time without header is ignored.
  - ii) If there is a header in between, the latter takes the precedence.

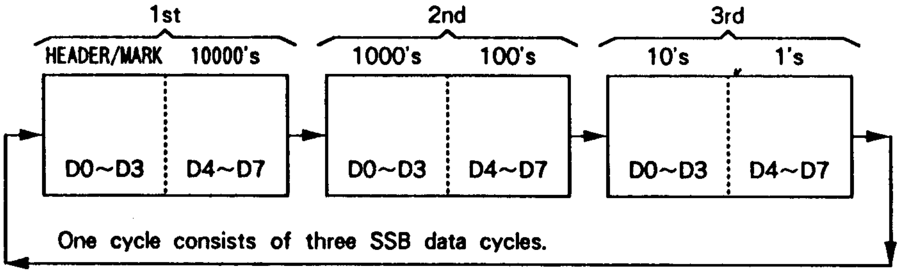

1st
2nd
3rd
HEADER/MARK
10000's
1000's
100's
10's
1's
D0~D3
D4~D7
D0~D3
D4~D7
D0~D3
D4~D7
One cycle consists of three SSB data cycles.

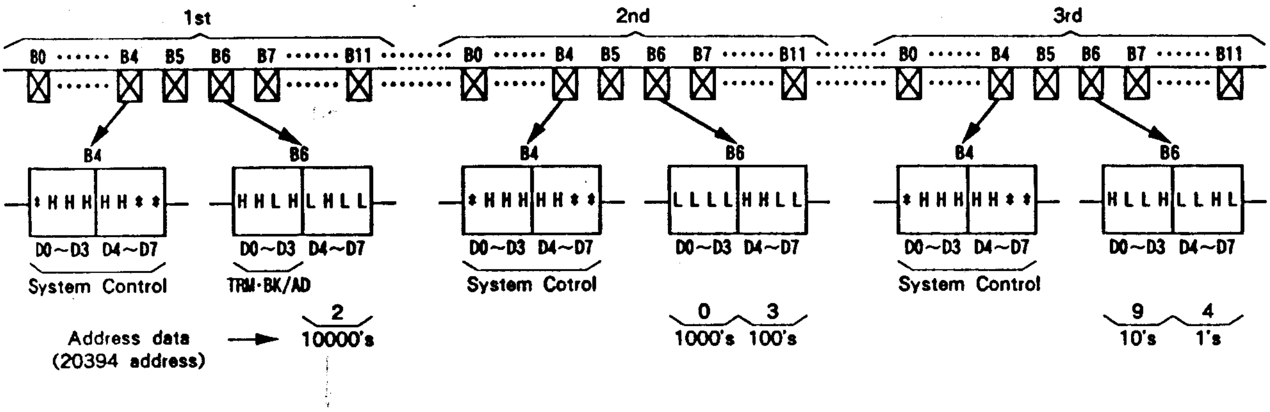
Fig. 2-9-1

| DISP DATA B 0~3 | DISP DATA B 4~7 | D7<br>D3 | D6<br>D2 | D5<br>D1 | D4<br>D0 |
|---|---|---|---|---|---|
| BLANK | BLANK | H | H | H | H |
| HEADER/TRM • ON | F | H | H | H | L |
| HEADER/CNTER + | S | H | H | L | H |
| HEADER/CNTER – | P | H | H | L | L |
| HEADER/TRM • BK/AD | C | H | L | H | H |
| – | – | H | L | H | L |
| 9 | 9 | H | L | L | H |
| 8 | 8 | H | L | L | L |
| 7 | 7 | L | H | H | H |
| 6 | 6 | L | H | H | L |
| 5 | 5 | L | H | L | H |
| 4 | 4 | L | H | L | L |
| 3 | 3 | L | L | H | H |
| 2 | 2 | L | L | H | L |
| 1 | 1 | L | L | L | H |
| 0 | 0 | L | L | L | L |

Table 2-9-1

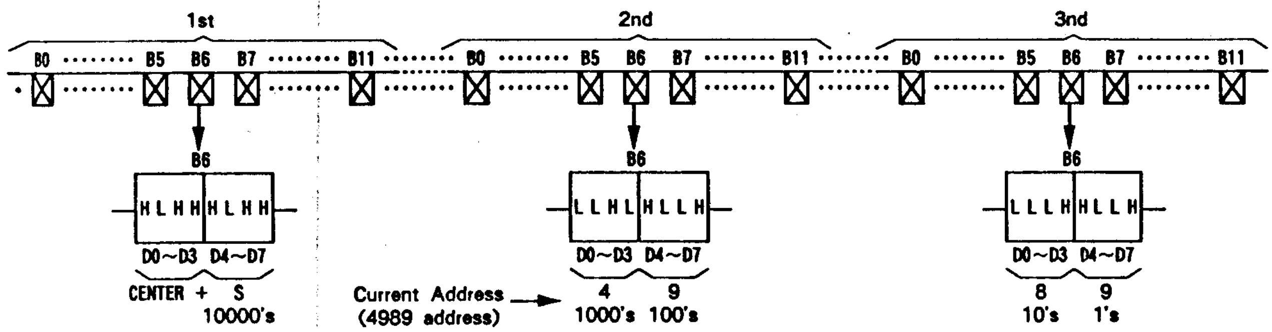
**< Example of Application >**

① If DATA SOURCE is SYSCON with HEADER/ TRM • BK/AD, ADDRESS is sent out.



1st
2nd
3rd
B0 ······ B4 B5 B6 B7 ······ B11
B4
B6
* H H H H H * *
H H L H L H L L
L L L L H H L L
H L L H L L H L
D0~D3 D4~D7
System Control
TRM·BK/AD
System Cotrol
2
Address data
(20394 address)
10000's
0
3
1000's
100's
9
4
10's
1's

②When 10000's is "S" with CNTER +, the current ADDRESS is sent out.



1st
2nd
3nd
B0 ········ B5 B6 B7 ········ B11
B6
H L H H H L H H
L L H L H L L H
L L L H H L L H
D0~D3 D4~D7
CENTER +
S
10000's
Current Address
(4989 address)
4
9
1000's
100's
8
9
10's
1's

Fig. 2-9-2

## 2-10. BLOCK 7

This block is a data signal for selected channel data, channel selection status, and during channel selection time or channel non-selection time. This signal is output from the TIMER/TUNING CONTROL MPU.

### 2-10-1. CH 0 – 3

- Data is established with four times of CHANNEL data as one cycle.
- At the time of entry
  - i) 5th time without header is ignored.
  - ii) If there is a header in between, the latter takes the precedence.

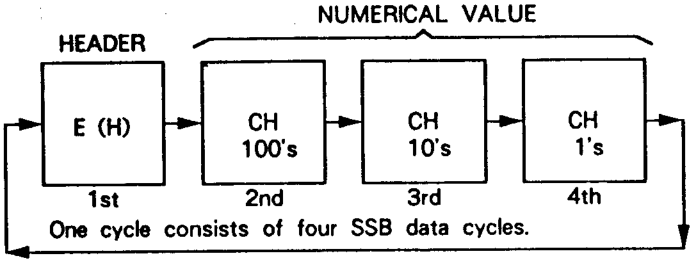

NUMERICAL VALUE
HEADER
E (H)
CH 100's
CH 10's
CH 1's
1st
2nd
3rd
4th
One cycle consists of four SSB data cycles.

Fig. 2-10-1

| HEADER | NUMERICAL VALUE | D3 | D2 | D1 | D0 |
|---|---|---|---|---|---|
| | BLANK | H | H | H | H |
| HEADER | HEADER | H | H | H | L |
| | S | H | H | L | H |
| | P (*) | H | H | L | L |
| | C | H | L | H | H |
| | – | H | L | H | L |
| | 9 | H | L | L | H |
| | 8 | H | L | L | L |
| | 7 | L | H | H | H |
| | 6 | L | H | H | L |
| | 5 | L | H | L | H |
| | 4 | L | H | L | L |
| | 3 | L | L | H | H |
| | 2 | L | L | H | L |
| | 1 | L | L | L | H |
| | 0 | L | L | L | L |

* CH 100's indicates "BS" when "P" on some models.

Table 2-10-1

### 2-10-2. STATION, TUNE PROCESS

- Selection status of CHANNEL No. of CH 0 – 3 is indicated.

| | TU. PRC D5 | STATI. D4 |
|---|---|---|
| TUNE END, BUT NO STATION | H | H |
| TUNE STATION COMPLETLY | H | L |
| TUNING PROCESS | L | H |
| DON'T CARE | L | L |

Table 2-10-2

### 2-10-3. PRESET

| | D7 |
|---|---|
| NORMAL | H |
| PRESET | L |

Table 2-10-3

## 2-11. BLOCK 8

### 2-11-1. INPUT SELECT SW 0, 1

- Switching control data acquired by using the INPUT SELECT SW.

| | IN. S1 D1 | IN. S0 D0 |
|---|---|---|
| TU | H | H |
| S.C | H | L |
| EXT | L | H |
| – | L | L |

Table 2-11-1

### 2-11-2. AUDIO OUT SELECT SW 0, 1

- Switching control data acquired by using the AUDIO OUT SELECT SW.

| | A. O. S1 D3 | A. O. S2 D2 |
|---|---|---|
| STEREO | H | H |
| L/MAIN | H | L |
| R/SUB | L | H |
| NORMAL | L | L |

Table 2-11-2

### 2-11-3. EXT1/EX2 SW

- Switching control data acquired by using the EXT1/EXT2 SW.

| | EX1/2S D4 |
|---|---|
| EXT1 | H |
| EXT2 | L |

Table 2-11-3

### 2-11-4. MIX PB SW

- Switching control data acquired by using the MIX PB SW.

| | MIX SW D5 |
|---|---|
| MIX OFF | H |
| MIX ON | L |

Table 2-11-4

## 2-12. BLOCK 9

This block is a operation mode data signal for Digital memory. This signal is output from the digital memory control MPU. The block 9 is used on models with the Digital memory function only.

### 2-12-1. D/M MODE 0 – 4

This block indicates the operation mode of digital memory.

PIP (α, β) indicates a picture-in-picture with the parent screen as α and the child screen as β.

| | | D. MOD4<br>D4 | D. MOD3<br>D3 | D. MOD2<br>D2 | D. MOD1<br>D1 | D. MOD0<br>D0 |
|---|---|---|---|---|---|---|
| DON'T USE MEMORY | | H | H | H | H | H |
| PIP (EE, EXT) | | H | H | H | H | L |
| PIP (EE, PB) | | H | H | H | L | H |
| PIP (EE, STL) | | H | H | H | L | L |
| PIP (EE, CUE) | | H | H | L | H | H |
| PIP (EE, RVW) | | H | H | L | H | L |
| PIP (PB, EE) | α β | H | H | L | L | H |
| PIP (PB, EXT) | (Parent, Child) | H | H | L | L | L |
| PIP (EXT, EE) | | H | L | H | H | H |
| PIP (EXT, PB) | | H | L | H | H | L |
| PIP (EXT, STL) | | H | L | H | L | H |
| PIP (EXT, CUE) | | H | L | H | L | L |
| PIP (EXT, RVW) | | H | L | L | H | H |
| | | H | L | L | H | L |
| | | H | L | L | L | H |
| MRY STL (TV) | | H | L | L | L | L |
| MRY STL (PLAY) | | L | H | H | H | H |
| MS (AUTO) | | L | H | H | H | L |
| MS (MANUAL) | | L | H | H | L | H |
| MS MRY | | L | H | H | L | L |
| MS STL | | L | H | L | H | H |
| MS BACK | | L | H | L | H | L |
| SS | | L | H | L | L | H |
| MS INDEX SCAN | | L | H | L | L | L |
| CH SCAN | | L | L | H | H | H |
| STL/SLW/×2S | | L | L | H | H | L |
| MEMORY LOCK (M/S) | | L | L | H | L | H |
| MEMORY LOCK (S/S) | | L | L | H | L | L |
| | | L | L | L | H | H |
| | | L | L | L | H | L |
| | | L | L | L | L | H |
| | | L | L | L | L | L |

Table 2-12-1

**[Abbreviations Used]**

| | |
|---|---|
| PIP | : PICTURE IN PICTURE |
| MRY STL | : MEMORY STILL |
| MS | : MALTI STROBE |
| SS | : SINGLE STROBE |
| SLW | : SLOW |
| × 2S | : × 2 SPEED PLAYBACK |
| CH | : CHANNEL |

### 2-12-2. DIGITAL NOISE REDUCTION

| | DNR D5 |
|---|---|
| DNR OFF | H |
| DNR ON | L |

**Table 2-12-2**

### 2-12-3. POSITION INIT

This signal is for placing the next saving screen image in the initial position in the case of the multi-screen.

| | P. INIT D6 |
|---|---|
| NEXT POSITION | H |
| INITIAL POSITION | L |

**Table 2-12-3**

### 2-12-4. MEMORY CLEAR

This block is a signal for clearing the data contents saved in memory.
When this bit has become "L", the digital memory clears the current memory contents.

| | M • INH D7 |
|---|---|
| MEMORY OPELATE | H |
| MEMORY INHIBIT | L |

**Table 2-12-4**

## 2-13. BLOCK 10 AND BLOCK 11

These blocks are currently not in use, but they are reserved as blank blocks for future uses.

## 2-14. OUTLINE OF THE SSB MONITOR AND THE SV S.DATA AND ATR DATA MONITOR

### 2-14-1. SSB Monitor (Jig No. VHJ-0055)

Sections 2-4 through 2-13 showed the contents of each SSB data block. In this way, readout of each block's bit condition allows to grasp the VCR operating condition. Furthermore, it can help determining the location of the cause of trouble in case the mechanism or the control circuit faults.
The SSB monitor (Jig No. VHJ-0055) reads individual bit conditions of the SSB data, displaying them through LEDs. A monitor screen can also be connected for display of readout results.
For details on operation of the SSB monitor, refer to the attached instruction manual.

### 2-14-2. SV S.DATA AND ATR DATA Monitor (Jig No. VHJ-0056)

The system control MPU described in the next section is the main control microcomputer of the SSB system. Besides the above-mentioned SSB serial data exchange, this MPU also performs serial data exchange between the digital servo IC and the ATR (Auto tracking) MPU. SV S.DATA and ATR DATA are among these exchanged data.
The SV S.DATA consists of operation mode data, tracking data, etc. sent out to the servo IC and the ATR MPU. ATR DATA consists of the results of tracking correction computing at the ATR MPU and data indicating to which degree system-control MPU tracking data should be corrected, sent from the ATR MPU to the system-control MPU as serial data.
Serial/parallel conversion is necessary for readout of both kinds of data, since other data are being sent serially and by time division.
This monitor displays the results of readout by serial/parallel conversion, in bit units, through LED indicators. This allows to grasp the present condition of the servo control system and to determine the location of the cause of trouble in case of malfunction.
For details on operation of this monitor, refer to the attached instruction manual.

## 2-15. SYSTEM-CONTROL MPU (IC301)

The system-control MPU (IC301) is the main control MPU of the SSB system.
System-control MPUs used for models of different classes are as follows :
Popular models (example : VHR-4100 series) : LC66508B 4-bit, 8 kbytes
Medium-class models (example : VHR-4300 series) : LC66512A 4-bit, 12 kbytes
High-class models (example : VHR-D4600 series) : LC66516A 4-bit, 16 kbytes

### 2-15-1. Function of Each Pin of the System-control MPU (LC66508B, (LC66512A) [LC66516A] series)

| Pin No. | Name | Input/Output Signal | I/O | | Input/Output Function |
|---|---|---|---|---|---|
| 1 | SI0 | SSB DATA | I | SSB | SSB input/output data |
| 2 | SO0 | | O | | |
| 3 | $\overline{\text{SCK0}}$ | SSB CLK | O | | Clock pulse output to SSB. |
| 4 | INT0 | CTL P. | I | External interrupt | 0 to approx. 5kHz pulse. 30Hz during PLAY and REC. |
| 5 | INT1 | (REF30 – 7 P] | I | | 30Hz pulse. Synchronized to VIDEO in the EE mode, and to the RF switch pulse during playback. |
| 6 | P31 | $\overline{\text{NORMAL}}$ [S.SSP] | O | Audio | (Output when audio is NORMAL) [Pulse input for sound-sync strobe]. |
| 7 | P32 | (DM REC+OSD) | O | Video | [Output during on-screen operations except when in INSERT mode or during digital-memory operation]. |
| 8 | $\overline{\text{HOLD}}$ | $\overline{\text{HOLD}}$ | | | + 5V |
| 9 | P40 | SW DATA 1 | I | Mechanism switch | Switches showing the mechanism position. |
| 10 | P41 | SW DATA 2 | I | | |
| 11 | P42 | SW DATA 3 | I | | |
| 12 | P43 | E P SW | I | | Switch for determining whether cassette recording is possible. |
| 13 | P50 | [$\overline{\text{V SYNC MUTE}}$] | O | [Digital memory] | [Signal for turning the dummy vertical sync signal off]. |
| 14 | P51 | 0/1 DATA | I | Servo | (Control pulse "0" or "1" data (for search function)). |
| 15 | P52 | CTL GAIN DOWN | O | | CTL AMP circuit gain switching signal. Output at POS SW 2 and less. |
| 16 | P53 | MC-BR | O | | Capstan motor brake signal. |
| 17 | SI1 | ATR DATA | I | Serial | Data input from the servo ATR microcomputer. |
| 18 | SO1 | SV S.DATA | O | | Serial data output to the servo IC. |
| 19 | $\overline{\text{SCK1}}$ | SV S.CLK | O | | Serial clock pulse output to the servo IC. |
| 20 | P63 | [MEMORY ON] | O | [Digital memory] | [Memory screen output command signal] |
| 21 | P70 | [AF REC] | O | | [Output signals for each type of digital memory operation] |
| 22 | P71 | [VD REC] | O | | |
| 23 | P72 | [LVL 0] | O | | [Output during DNR operation. Signals for DNR operation L, M & H] |
| 24 | P73 | [LVL 1] | O | | |
| 25 | P80 | [DNR MODE] | O | | [Output during DNR operation. DNR operation ON signal]. |
| 26 | P81 | [$\overline{\text{SCLR}}$] | O | | [Operation disabling signal for the digital memory gate array]. |
| 27 | P82 | [WRITE] | O | | [Command signal for memory write-in]. |
| 28 | P83 | [0.5H] | O | | [0.5H correction signal. Output during STILL, MEMORY STILL and SS modes]. |
| 29 | $\overline{\text{INT2}}$ | $\overline{\text{RF SW P.}}$ | I | External | 0 to 30Hz pulse. 30Hz during playback, etc. |
| 30 | TEST | | | | Ground |
| 31 | Vss | | | | Ground |
| 32 | OSC1 | | | | MPU clock oscillation output pins. Clock frequency is 4MHz. |
| 33 | OSC2 | | | | |
| 34 | $\overline{\text{RES}}$ | $\overline{\text{RESET}}$ | I | | MPU initial setting or all-clear. |
| 35 | $\overline{\text{INT3}}$ | DOC P. | I | External interrupt | * Pulse with an amplitude greater than 0 and smaller than 33ms. STILL noise shifting pulse (output in the STILL and MEMORY STILL modes). |
| 36 | $\overline{\text{INT4}}$ | $\overline{\text{AV CTL}}$ | I | | ANT/VIDEO output is fixed to ANT at low level. |
| 37 | INT5 | C. FG P. | I | | 0 to approx. 6kHz pulse. The frequency required for recognition is approx. 300Hz. |
| 38 | PA0 | ML-F | O | Motor drive | Forward direction loading command signal (FL, TL). |
| 39 | PA1 | ML-R | O | | Reverse direction loading command signal (FL, TL). |
| 40 | PA2 | ML-L | O | | Low loading speed command signal. |
| 41 | PA3 | ML-M | O | | Medium loading speed command signal. |
| 42 | PB0 | REC | O | Video | Recording command signal. |
| 43 | PB1 | P. B. HIGH | O | | Playback screen output command signal. |
| 44 | PB2 | STILL+SLOW+X2S | O | | (Output in the STILL, SLOW and X2S modes). |
| 45 | PB3 | SPECIAL PLAY | O | | Output in the special playback (CUE, REV, STILL, SLOW, F.ADV, A. DUB PAUSE) modes. |
| 46 | PC0 | ANT/$\overline{\text{VIDEO}}$ | O | | ANT/VIDEO switching signal. |
| 47 | PC1 | [INSERT HIGH] | O | | [Output in the INSERT mode]. |
| 48 | PC2 | [FE CONTROL] | O | | |
| 49 | VREF1 | REF VOLT | I | Sensor | Reference voltage for the microcomputer built-in comparator. |
| 50 | PD0 | REEL P. | I | | 0 to approx. 300Hz pulse. Its period changes according to reel table rotation. |
| 51 | PD1 | DEW S. | I | | For dew detection. |
| 52 | CMP2 | $\overline{\text{TAPE TOP S.}}$ | I | | For tape winding start detection. |
| 53 | CMP3 | $\overline{\text{TAPE END S.}}$ | I | | For tape winding end detection. |
| 54 | TRA | FL SW | I | Mechanism switch | Front loading mechanism switch (3 values input : Low = cassette out ; medium = FL mode ; high = cassette loading completed). |
| 55 | TRB | TAPE SPEED | I | Servo | Result of tape speed detection by the servo system (high = LP ; low = SP). |
| 56 | P00 | A · MUTE | O | Audio | Audio output inhibiting indication signal. |
| 57 | P01 | A · REC MUTE | O | | Normal audio output and recording inhibiting indication signal. |
| 58 | P02 | [BIAS CTL] | O | | Recording bias timing control. |
| 59 | P03 | X2S | O | | Output in the X2S mode. |
| 60 | P10 | [A · DUB] | O | | Output in the A. DUB mode. |
| 61 | P11 | POWER UP | O | Power supply | Output always except when power is off. |
| 62 | P12 | AUDIO SELECT 0 | O | Audio | (Audio ST/L/R switching output) |
| 63 | P13 | AUDIO SELECT 1 | O | | |
| 64 | Vdd | | | | + 5V |

**Table 2-15-1**

Functions between brackets ( ) are provided in the LC66512A for medium-class models, and those between square brackets [ ] in the LC66516A for high-class models. Other functions are common for all models, except the one marked * which is only included in the LC66508B for popular models.

## 2-15-2. Description of the Main Input Signals of the System-control MPU (IC301)

### 1) Mechanism Mode Detection Switch Data (Pins 9, 10 and 11)

In addition to the VCR main unit operation modes (STOP, F.FWD, REW, PLAY, REC, R-SEARCH, F-SEARCH, STILL, SLOW and ETS), there are several mechanism exclusive modes (listed below). At these modes, set momentarily at the time of VCR main unit mode switching, important tape protecting operations, etc. are performed.

In order to execute mode control, the mechanism mode detection switch data (a rotary switch is used to output 3-bit mechanism mode data) and the front-loading mechanism switch data signal, described below, are input to the system control MPU and used for computing control.

- 3-bit Mechanism Mode Detection Switch Data

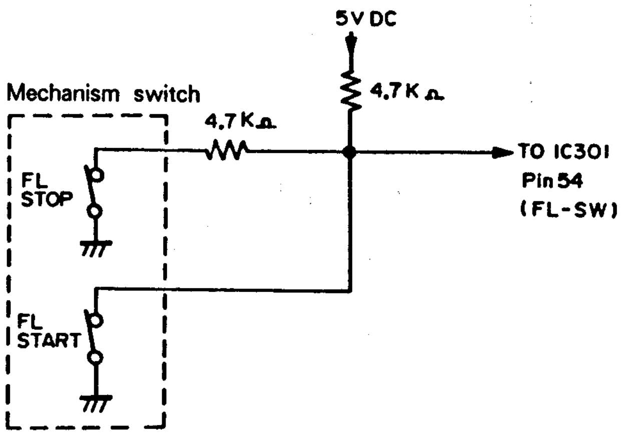
| Mechanism Mode SW Pos. No. | Mechanism Mode Detection SW Input | | | Mechanism Mode Names | VCR Main Unit Mode Names |
|---|---|---|---|---|---|
| | SW DATA1 Pin 9 | SW DATA2 Pin 10 | SW DATA3 Pin 11 | | |
| 7 | L | L | L | INITIAL | STAND BY (Power OFF at cassette IN) |
| 1 | L | H | H | BRAKE | None |
| 2 | H | L | H | STOP | STOP, F • FWD, REW |
| 3 | L | L | H | STILL | STILL, F • ADV, SLOW, PAUSE |
| 4 | H | H | L | PLAY | PLAY, REC, F-SEARCH, × 2S |
| 5 | L | H | L | IDLER (at F/R transition) | None |
| 6 | H | L | L | REV. | R-SEARCH |
| 0 | H | H | H | During mode changing | None |

Table 2-15-2

### 2) Front-Loading Switch Input (Pin 54)

The mechanism is equipped with a switch to detect cassette ejection and insertion (FL START switch), and another to detect completion of cassette loading (FL STOP).

These two switches are included in the circuit shown below, which generates the variable voltage (three values) to be input to Pin 54 of the system-control MPU (IC301) for front-loading condition computing.



- Front Loading 3 - Value Variable Voltage Generation Circuit

Fig. 2-15-1

- **3 Values of the Variable Input Voltage and Front Loading Conditions**

| FL-SW (Voltage input to Pin 54) | Front Loading Condition |
|---|---|
| LOW (0V) | Cassette out |
| MID (2.5V) | Front loading period from cassette insertion |
| HIGH (5V) | Cassette loading completed |

Table 2-15-3

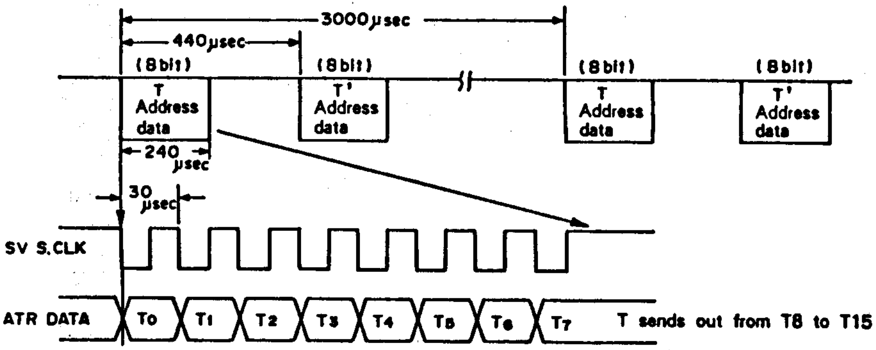
### 3) Tracking Data Input from the ATR MPU (ATR DATA : Pin 17) (Applicable to models equipped with the ATR (Auto Tracking) function)

The system-control MPU outputs tracking data, with the preset values corresponding to each mode, to the servo IC and the ATR MPU through the SV S.DATA line. The ATR MPU calculates, from the envelope sampling value and the tracking data, how much this latter should be turned up or down, then inputs the corresponding data correction command to the system-control MPU as serial data.

For example, in case a ΔT up/down operation becomes necessary after SV S.DATA has sampled the envelope at a T0 tracking value, this ΔT is sent out from the ATR MPU as serial data.

Transmission of this data (ATR DATA) is performed as shown in the diagram below.

**[ATR Data Form]**



* ATR DATA is sent out from ATR MPU in the SV S.CLK timing from the system-control MPU.

Fig. 2-15-2

**[Contents of the ATR Serial Data T/T']**

| BIT | T Data Contents |
|---|---|
| T0 | TRK 0 |
| T1 | TRK 1 |
| T2 | TRK 2 |
| T3 | TRK 3 |
| T4 | TRK 4 |
| T5 | TRK 5 |
| T6 | UP/DOWN |
| T7 | Block recognition "H" |

| BIT | T' Data |
|---|---|
| T8 | ATR ENV |
| T9 | ATR DISP1 |
| T10 | ATR DISP2 |
| T11 | TRK - SEL |
| T12 | * |
| T13 | * |
| T14 | * |
| T15 | Block recognition "L" |

Table 2-15-4

* : Not used

**[Description of T Data Contents]**

a. T0 to T5 (track 0 to track 5)
Tracking value correction amount data. Track 0 is the least significant bit.

| TRK5 | TRK4 | TRK3 | TRK2 | TRK1 | TRK0 | Correction Amount |
|---|---|---|---|---|---|---|
| L | L | L | L | L | L | 0 count |
| L | L | L | L | L | H | 1 count |
| ⇩ | ⇩ | ⇩ | ⇩ | ⇩ | ⇩ | ⇩ |
| H | H | H | H | H | L | 62 count |
| H | H | H | H | H | H | 63 count |

Table 2-15-5

b. T6 (up/down)
Command data to indicate whether tracking correction should be performed in the upward or downward direction (set to "up, 0 count" when tracking correction amount is zero).
"H" : Up
"L" : Down

c. T7 (Block Recognition Bit)
Bit for T data block recognition. Normally "H".

**[T' Data Contents]**

a'. T8 (ATR ENV)
This bit is applicable only to the SP mode of the NTSC system. It is "H" under the following conditions :

Double Speed Playback

- From the instant when the double speed playback is set until the ATR MPU computes the optimum tracking value.

STILL Mode

- From the instant when the STILL mode is set until the noise shifting operation is completed.

SLOW Mode

- From the instant when the SLOW mode is set until when no more tracking value changes are performed (tracking correction amount = 0).

b'. T9, T10 (ATR DISP1, 2)
ATR MPU operating condition data.

| ATR DISP 1 | ATR DISP 2 | Operating Condition | |
|---|---|---|---|
| L | L | Manual detection | ATR ON signal "H" |
| L | H | ATR operation (during detection) | ATR ON signal "L" |
| H | L | ATR operation (detectiorcompleted) | ATR ON signal "L" |
| H | H | When the optimum ATR value could not be detected | ATR ON signal "L" |

**Table 2-15-6**

c'. T11 (TRK SEL)
These data, stored inside the system-control MPU, switch the tracking data table during the SLOW and STILL modes. The system-control MPU is provided with two kinds of SLOW/STILL data tables, SL – TR1 and SL – TR2. Selection between the two is performed by the TRK SEL serial data from the ATR MPU.

TRK SEL "H" : SL-TRK1 is selected (preset value : 46)
TRK SEL "L" : SL-TRK2 is selected (preset value : 69)

d'. T15 (Block Recognition Bit)
Bit for T' data block recognition. Normally "L".

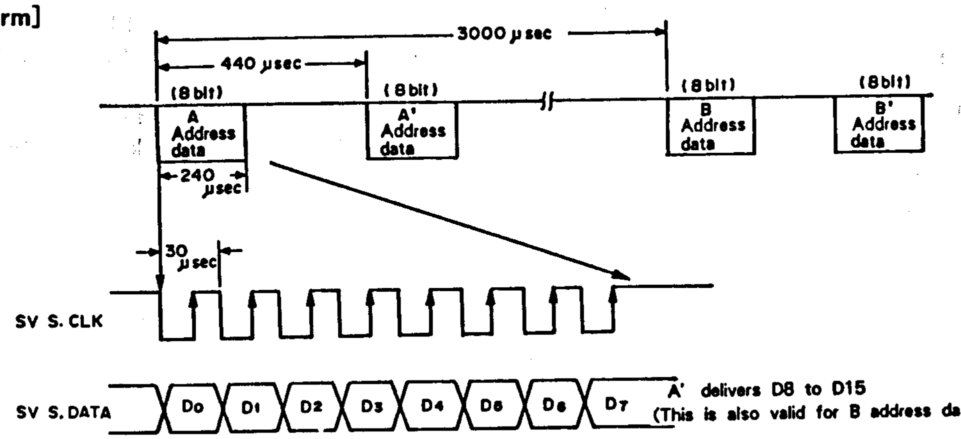
### (3) Description of the Main Output Signals of the System-control MPU (IC301)

Besides performing data exchange with the timer/tuning control MPU, the remaining tape calculating MPU, etc. through the SSB line, the system-control MPU outputs control signals to each individual pin. The main control signal among these are described next.

#### 1) SV S.DATA (Pin 18)

Sends out mode data, tape speed data, tracking data, etc. to the digital servo IC and the ATR MPU in the form shown below.

[SV S.DATA Form]


3000 μsec
440 μsec
(8 bit)
A Address data
(8 bit)
A' Address data
(8 bit)
B Address data
(8 bit)
B' Address data
240 μsec
30 μsec
SV S. CLK
SV S. DATA
D0
D1
D2
D3
D4
D5
D6
D7

A' delivers D8 to D15 (This is also valid for B address data)

• SV S.DATA output timing

Fig. 2-15-3

[SV S.DATA Contents]

| | A Address Data | B Address Data |
|---|---|---|
| D0 | MODE – D0 | TRK – DATA0 |
| D1 | MODE – D1 | TRK – DATA1 |
| D2 | MODE – D2 | TRK – DATA2 |
| D3 | MODE – D3 | TRK – DATA3 |
| D4 | F/R | TRK – DATA4 |
| D5 | TS – CNT0 | TRK – DATA5 |
| D6 | TS – CNT1 | TRK – DATA6 |
| D7 | TS – CNT2 | SLOW/NORM |
| | A' Address Data | B' Address Data |
| D8 | CAP – ON | CTL – DUTY |
| D9 | DRUM – ON | REMARK |
| D10 | ENV – ON | ATR ON |
| D11 | VD – ON | STILL/SLOW |
| D12 | * | * |
| D13 | F – ADV – P | * |
| D14 | * | * |
| D15 | Address Differ. "1" | Address Differ. "0" |

* : Not used

Table 2-15-7

**[Description of SV S.DATA Contents] …LOW Activ (1 = Low, 0 = High)**

1. A Address Data D0 to D3 (Modes D0 to D3)
   Operation mode indicating data for the servo IC and the ATR MPU

| MODO D0~D3 | | | | Operation Mode | Servo Control Condition |
|---|---|---|---|---|---|
| D3 | D2 | D1 | D0 | | |
| 0 | 0 | 0 | 0 | EE M SPD1 | Used for reel rotation speed control when entering the EE and playback modes. |
| 0 | 0 | 0 | 1 | PB M SPD1 | |
| 0 | 0 | 1 | 0 | EE M SPD2 | |
| 0 | 0 | 1 | 1 | FF + REW | F.FWD/REW mode. |
| 0 | 1 | 0 | 0 | PB M SPD2 | Same as the above-mentioned PB M SPD1. |
| 0 | 1 | 0 | 1 | STILL | STILL mode w/o noise shifting. |
| 0 | 1 | 1 | 0 | INSERT | INSERT mode control. |
| 0 | 1 | 1 | 1 | REC | Recording mode. |
| 1 | 0 | 0 | 0 | EDIT | Continued shooting control. |
| 1 | 0 | 0 | 1 | PB NOR | Playback mode. |
| 1 | 0 | 1 | 0 | PB D-FX | Entering the playback mode. |
| 1 | 0 | 1 | 1 | PB *2 | Entering the playback mode. |
| 1 | 1 | 0 | 0 | SEARCH1 | Search mode. |
| 1 | 1 | 0 | 1 | SEARCH2 | Entering the search mode. |
| 1 | 1 | 1 | 0 | FINE STILL | STILL with noise shifting. |
| 1 | 1 | 1 | 1 | FINE SLOW | Intermittent SLOW with noise shifting. |

**Table 2-15-8**

2. A Address Data D4 (F/R)
   Advance (FWD) or reverse (REV) tape transport direction indicating data.
   1 = Advance
   0 = Reverse

3. A Address Data D5 to D7 (TS-CNT0 to 2)
   Tape speed SP/LP/EP control indication.

| TS-CNT0 | TS-CNT1 | TS-CNT2 | Servo IC Operating Condition | |
|---|---|---|---|---|
| 0 | 0 | 0 | Tape speed recognition. | |
| 0 | 0 | 1 | EP | |
| 0 | 1 | 0 | LP | |
| 0 | 1 | 1 | SP | |
| 1 | 0 | 0 | Hold condition. Data just before TS-CNT0 becomes "1". | |
| 1 | 0 | 1 | EP | After TS-CNT0 is set to "1" and the servo IC to the respective tape speed, TS-CNT1 and TS-CNT2 are set to "0", entering the hold condition above. |
| 1 | 1 | 0 | LP | |
| 1 | 1 | 1 | SP | |

* In PAL models, EP is treated as LP, resulting in two speed settings.

**Table 2-15-9**

4. A' Address Data D8 (CAP-ON)
Capstan motor rotation/stop indicating data
    1 : Rotation (CSE is output from the servo IC)
    0 : Stop

5. A' Address Data D9 (DRUM-ON)
Head drum motor rotation/stop indication
    1 : Rotation (DSC is output from the servo IC)
    0 : Stop

6. A' Address Data D10 (ENV-ON)
ON/OFF indication for the envelope detection signal input to the servo IC
    1 : ON (ROTARY and HA-SW signals are switched by the envelope signal at the servo IC)
    0 : OFF (The envelope signal is ignored)

7. A' Address Data D11 (VD-ON)
ON/OFF indication for the dummy VD signal output from the servo IC
    1 : VD output ON
    0 : VD output OFF

8. A' Address Data D13 (F-ADV-P)
Frame-advance control signal used for noiseless SLOW and STILL playback
When this bit is "1", the servo IC performs frame-advance operation synchronized to the RF-SW pulse reference edge.

9. A' Address Data D15
A/A' addresses differentiating bit. Normally "1".

10. B Address Data D0 to D6 (TRK-DATA 0 to 6)
Compose the tracking data with the 7-bit codes shown below.

(B Address Data D0 to D6, Tracking Data Table)

| DATA 0 | DATA 1 | DATA 2 | DATA 3 | DATA 4 | DATA 5 | DATA 6 | Servo IC TRC Step |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | Double speed preset 35 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 1 | 0 | 0 | 0 | 1 | 0 | 1 | Slow preset 46 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 1 | 0 | 1 | 0 | 0 | 0 | 1 | Playback preset 58 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 126 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 127 |

* At the servo IC, a tracking delay corresponding to the TRK-DATA is allowed.

**Table 2-15-10**

11. B Address Data D7 (SLOW/NORM)
Signal indicating whether the TRK-DATA delivered by the B addresses is for the SLOW or NORMAL mode
    1 : Input SLOW mode tracking data
    0 : Input NORMAL mode tracking data

12. B' Address Data D8 (CTL-DUTY)
Duty specification for the CTL recording signal output from the servo IC (used for VISS/VASS control)
    1 : CTL DUTY is specified to approx. 28% (code "1")
    0 : CTL DUTY is specified to approx. 60% (code "0")

13. B' Address Data D9 (REMARK)
CTL signal re-recording indication (used for VISS/VASS control)
    1 : CTL signal rewriting
    0 : No operation

14. B' Address Data D10 (ATR-ON)
Operation indicating signal sent to the ATR MPU (only for models provided with ATR function)
    1 : The ATR MPU performs tracking calculation control.
    0 : No operation

15. B' Address Data D11 (STILL/SLOW)
Indicates the ATR MPU to set the STILL or SLOW mode (only for models provided with ATR function).
    1 : STILL mode
    0 : SLOW mode

16. B' Address Data D15
B/B' addresses differentiating bit. Normally "0".

### 2) Control Signals for the Digital Memory (work with the LC66516A for high-class models)

The control signals for the digital memory are composed of signals output from the SSB line, which inputs/outputs the above-mentioned serial data, and from the various pins of the system-control MPU.
Signals turned into data through 2 or more pins will be described here.

a. DNR (Digital Noise Reduction) Control Signals (LVL, DNR MODE)

LVL 0: Pin 23 output
LVL 1: Pin 24 output
DNR MODE: Pin 25 output

| DNR MODE | LVL 0 | LVL 1 | Control Condition |
|---|---|---|---|
| 0 | 0 | 0 | DNR OFF |
| 1 | 1 | 0 | DNR ON (HIGH) |
| 1 | 0 | 1 | DNR ON (MID) |
| 1 | 1 | 1 | DNR ON (LOW) |

1 : HIGH, 0 : LOW

**Fig 2-15-11**

- DNR operation changes as shown below each time the DNR key is pressed, if set initially to DNR-OFF.

→ DNR OFF → DNR ON (HIGH) → DNR ON (MID) → DNR ON (LOW)

**Table 2-15-12**

1. Digital Mode Control Signals (PAL MODE 0/1) (only for PAL models)

PAL MODE 0 : Pin 21
PAL MODE 1 : Pin 22

| PAL MODE 0 | PAL MODE 1 | Digital Operation mode |
|---|---|---|
| 0 | 0 | Other than the modes below |
| 1 | 0 | MEMORY STILL, SINGLE STROBE |
| 0 | 1 | SLOW, F.ADV, STILL |
| 1 | 1 | Double-speed playback |

0 : LOW, 1 : HIGH

**Table 2-15-13**

### 3) Audio Signal Control Output

a. Audio Output Switching Control Signal

The audio signal control signal, corresponding to the control data of the SSB line (block 8), which inputs/outputs the above-mentioned serial data, is output from various pins of the system-control MPU. Signals turned into data through 2 or more pins will be described here.

NORMAL : Pin 6
AUDIO SELECT 0 : Pin 62
AUDIO SELECT 1 : Pin 63

| AUDIO SELECT 0 | AUDIO SELECT 1 | NORMAL | Audio Switching Operation |
|---|---|---|---|
| OPEN | LOW | HIGH | STEREO |
| OPEN | OPEN | HIGH | L/MAIN |
| LOW | OPEN | HIGH | R/SUB |
| LOW | LOW | LOW | NORMAL |

**Table 2-15-14**

## 2-16. ATR (AUTO TRACKING) MPU (IC381 : M50927 Series) ( for modesl equipped with ATR function)

Using as a reference the tracking data sent from the system-control MPU as SV S. data during video playback, the ATR MPU converts the detected playback envelope signal into digital, then calculates to which degree the optimum tracking value (which makes playback envelope level maximum) differs from the above-mentioned reference tracking data. The resulting data (indicating how many counts and in which direction the reference tracking data should be corrected) are sent out to the system-control MPU as serial ATR data. The MPU original tracking data are corrected by adding to them the ATR data correction value. After this correction, the tracking data are sent to the servo IC and the ATR MPU through the SV S. DATA line. The ATR MPU determines whether these data should be further corrected. The optimum tracking value is obtained by repeating this ATR operation. On the other hand, the servo IC uses the tracking data gradually corrected by the ATR operation to control rotation of the capstan motor, allowing for a smoother and more precise servo control.

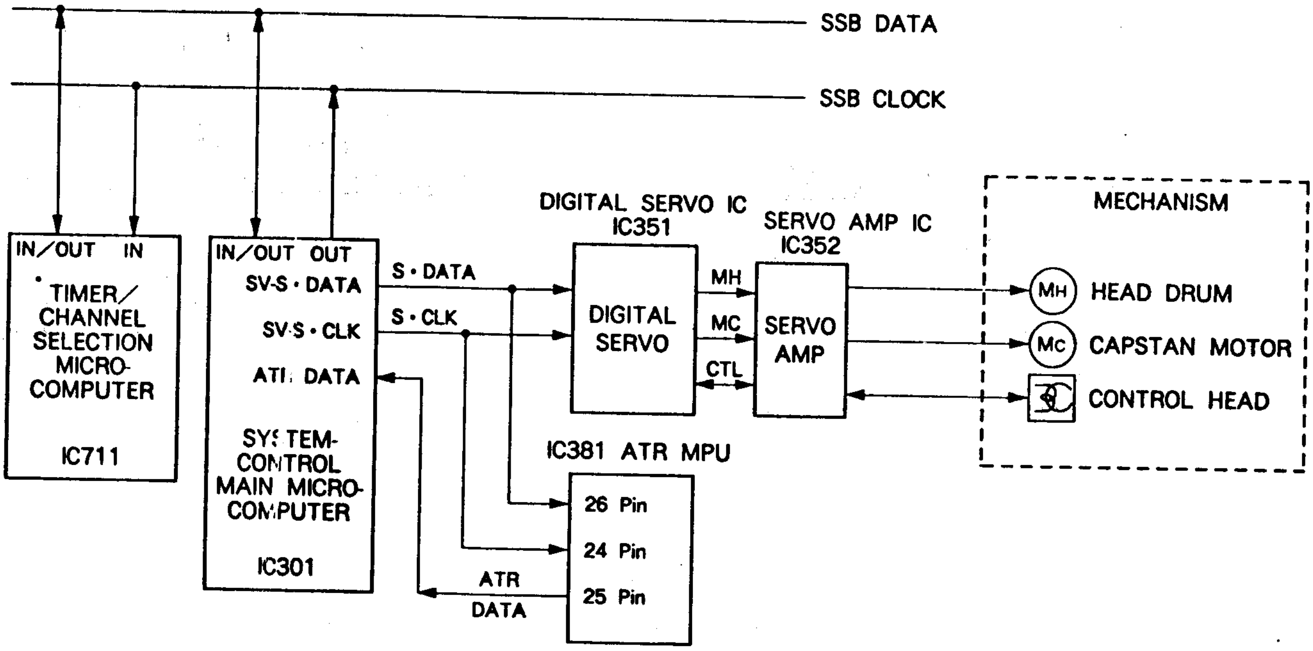

SSB DATA
SSB CLOCK
IN/OUT
IN
TIMER/
CHANNEL
SELECTION
MICRO-
COMPUTER
IC711
IN/OUT
OUT
SV-S・DATA
SV-S・CLK
ATR DATA
SYSTEM-
CONTROL
MAIN MICRO-
COMPUTER
IC301
S・DATA
S・CLK
DIGITAL SERVO IC
IC351
DIGITAL
SERVO
MH
MC
CTL
SERVO AMP IC
IC352
SERVO
AMP
MECHANISM
MH
HEAD DRUM
Mc
CAPSTAN MOTOR
CONTROL HEAD
IC381 ATR MPU
26 Pin
24 Pin
25 Pin
ATR
DATA

Fig 2-16-1

### 2-16-1. ATR Operation Modes

- PLAY Mode
  When the operation button (TRACK) is pressed in the PLAY mode, the ATR ON signal sent in by the serial SV S. data is confirmed, starting ATR operation. Namely, in the PLAY mode the ATR operation is not performed automatically; it should be started manually.
- STILL Mode/SLOW Mode/×2 Speed Playback Mode
  When entering one of these modes, the ATR ON signal is sent in automatically by the serial SV S. data from the system-control MPU, and ATR operation starts automatically.

### 2-16-2. Principle of ATR Operation

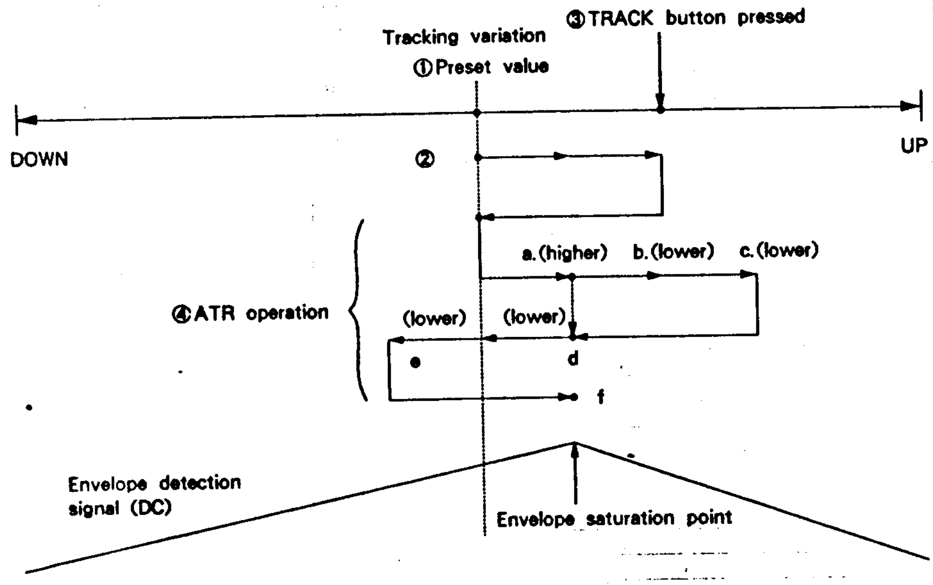


Fig. 2-16-2

④ATR Operation

a. A 2-step upward correction command is issued.

b. The envelope level after 2-step correction is compared with that just after preset. If the former is higher than the latter, this higher value is used as reference for the next envelope comparison.

c. The 2-step upward correction command is given again. If this time envelope comparison gives a "lower" result, a third 2-step upward correction command is issued.

d If two consecutive envelope comparisons give a "lower" result, the value is lowered to the step before getting "lower", then downward correction is performed from there.

e. If two consecutive envelope comparisons give a "lower" result during downward correction, the middle point between two upward "lower" results and two downward "lower" results is taken as the envelope saturation point.

f. Finally, upward correction is performed to the detected saturation point. This completes ATR operation.

Note :Envelope comparison always gives one of the following results : "higher", "lower" or "equal".

- The above diagram (Fig. 2-16-2) shows manual ATR operation in the PLAY mode. A detailed explanation of this operation sequence follows.

① When the VTR enters the PLAY mode, the playback preset tracking data is sent out to the servo IC and the ATR MPU from the system-control MPU by the SV S. DATA, starting the initialize operation. Since the ATR ON signal input to the ATR MPU as SV S. DATA at this time is "high", ATR operation does not takes place, and a tracking correction amount (ATR data) of "UP 0" is sent to the MPU.

② If the manual tracking button (+/-) is pressed in this condition, the system-control MPU will perform up/down correction on the playback preset tracking data.

③ If the IR remote control ATR button (TRACK) is pressed, the system-control MPU will set its own tracking data back to the playback preset value, and simultaneously send the SV S. DATA ATR ON signal "low" to the ATR MPU.

④ Upon receiving the ATR ON signal "low", the ATR MPU starts ATR operation. The first ATR operation is performed using the tracking data as it was just before the ATR ON signal became "low". Then, a command indicating for how many counts the tracking data should be corrected is sent to the system-control MPU as serial ATR data. The ATR MPU uses the received corrected tracking data to execute the second ATR operation. This sequence of operations is repeated until the optimum tracking value is obtained. When the ATR MPU detects this optimum value, ATR operation is finished and tracking correction amount (ATR data) is reset to "UP 0".

Note : When entering the still/slow/×2 speed mode, the ATR ON signal "low" is automatically input to the ATR MPU, so the ATR operation in ④ is performed. Furthermore, if the manual (+/-) button is pressed during ATR operation, this operation stops and manual operation takes priority.

## 2-16-3. Table of ATR MPU Pin Functions

- For information on Pin 24 (SV S. data) and Pin 25 (ATR data), refer to section 2-15.

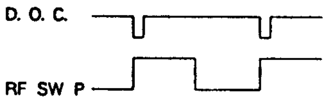
<table>
<tr><th>Pin No.</th><th>Name</th><th>Input/Output Signal</th><th>I/O</th><th>Input/Output Function</th></tr>
<tr><td>1</td><td>$\overline{\text{RESET}}$</td><td>$\overline{\text{RESET}}$</td><td>I</td><td>Reset input. "L" level is applied to this pin, the microcomputer is reset.</td></tr>
<tr><td>2</td><td>INT</td><td>RF SW P</td><td>I</td><td>RF switch pulse input. Receives external interrupt signals.<br>The head switching signal (square, 25Hz) is input here.</td></tr>
<tr><td>3</td><td>AVss</td><td>AVss</td><td></td><td>Analog power input. Ground terminal for the A/D converter.</td></tr>
<tr><td>4</td><td>VREF</td><td>VREF</td><td>I</td><td>Reference voltage input. Input terminal for A/D converter reference power.</td></tr>
<tr><td>5</td><td>$K_0$</td><td>ENV</td><td>I</td><td rowspan="2">Analog input terminal for the A/D converter. The playback video signal envelope detection output is input to ENV, and the playback audio Hi-Fi signal envelope detection output to Hi-Fi ENV. In Hi-Fi models, video ENV and audio ENV signals are combined, and tracking control is performed at the optimum point for both.</td></tr>
<tr><td>6</td><td>$K_1$</td><td>HIFI ENV</td><td>I</td></tr>
<tr><td>7</td><td>AVDD</td><td>AVDD</td><td></td><td>Analog power input. Power input terminal for the A/D converter.</td></tr>
<tr><td>8</td><td>$S_0$</td><td>NTSC/PAL</td><td>I</td><td rowspan="4">Receives signals indicating the TV system, the number of video heads and whether digital functions are available or not, setting auto-tracking operation mode accordingly as follows:<br>* : Not used
<table>
<tr><th>$S_3$<br>DIGITAL</th><th>$S_2$<br>3-head</th><th>$S_1$<br>2-head</th><th>$S_0$<br>NTSC/PAL</th><th>Operation mode</th></tr>
<tr><td>L</td><td>L</td><td>L</td><td>L</td><td>*</td></tr>
<tr><td>L</td><td>L</td><td>L</td><td>H</td><td>*</td></tr>
<tr><td>L</td><td>L</td><td>H</td><td>L</td><td>PAL 2-head</td></tr>
<tr><td>L</td><td>L</td><td>H</td><td>H</td><td>NTSC 2-head</td></tr>
<tr><td>L</td><td>H</td><td>L</td><td>L</td><td>PAL 3-head</td></tr>
<tr><td>L</td><td>H</td><td>L</td><td>H</td><td>NTSC 3-head</td></tr>
<tr><td>L</td><td>H</td><td>H</td><td>L</td><td>PAL 4-head</td></tr>
<tr><td>L</td><td>H</td><td>H</td><td>H</td><td>NTSC 4-head</td></tr>
<tr><td>H</td><td>L</td><td>L</td><td>L</td><td>*</td></tr>
<tr><td>H</td><td>L</td><td>L</td><td>H</td><td>*</td></tr>
<tr><td>H</td><td>L</td><td>H</td><td>L</td><td>PAL 2-head digital</td></tr>
<tr><td>H</td><td>L</td><td>H</td><td>H</td><td>*</td></tr>
<tr><td>H</td><td>H</td><td>L</td><td>L</td><td>*</td></tr>
<tr><td>H</td><td>H</td><td>L</td><td>H</td><td>*</td></tr>
<tr><td>H</td><td>H</td><td>H</td><td>L</td><td>PAL 4-head digital</td></tr>
<tr><td>H</td><td>H</td><td>H</td><td>H</td><td>NTSC 4-head digital</td></tr>
</table></td></tr>
<tr><td>9</td><td>$S_1$</td><td>2HEAD</td><td>I</td></tr>
<tr><td>10</td><td>$S_2$</td><td>3HEAD</td><td>I</td></tr>
<tr><td>11</td><td>$S_3$</td><td>DIGITAL</td><td>I</td></tr>
<tr><td>12</td><td>$D_0$</td><td>HIFI</td><td>I</td><td>A "high" level signal is input to this pin when inputs to Pin 5 (ENV), Pin 6 (Hi-Fi ENV) and their composite are detected.</td></tr>
<tr><td>13</td><td>$D_1$</td><td>ENV SEL</td><td>I</td><td>Envelope selector signal. Detects the envelope signal in 4-head models.</td></tr>
<tr><td>14</td><td>CNVss</td><td>CNVss</td><td>I</td><td>This pin is connected to Vss in order to keep its input always "low" (0 V).</td></tr>
<tr><td>15</td><td>Vss</td><td>Vss</td><td></td><td>GND</td></tr>
<tr><td>16</td><td>$D_2$</td><td>CTL</td><td>I</td><td>Control pulse input terminal. Used for detection of abnormalities during ATR operation.</td></tr>
<tr><td>17</td><td>$D_3$</td><td>$\overline{\text{ATR CANCEL SW}}$</td><td>I</td><td>ATR operation is stopped when a change from "high" to "low" level is detected.</td></tr>
<tr><td>18</td><td>$D_4$</td><td>SLOW TR PULSE</td><td>I</td><td>Receives the tracking pulse (Ʊ) during normal slow servo operation. It becomes "high" if an abnormality occurs, disabling the ATR operation.</td></tr>
<tr><td>19</td><td>$D_5$</td><td>NOISE ADV PULSE</td><td>O</td><td>If noise pulse is not in the normal position when changing from playback to STILL mode, a noise advance pulse is output from this pin.</td></tr>
<tr><td>20</td><td>$D_6$</td><td>SP</td><td>I</td><td>Inputs the result of tape speed recognition. "High" in the SP mode, otherwise "low".</td></tr>
<tr><td>21</td><td>$D_7$</td><td>D. O. C.</td><td>O</td><td>ATR operation detection signal input for 2-head models equipped with special playback functions.<br>Advance noise generated once every field during still playback in 2-head models into the vertical blanking periods (upper or lower portions of the TV screen) to obtain a noiseless picture. This is achieved by advancing this D.O.C. (noise position) to rise position of RF switching pulse.<br> </td></tr>
<tr><td>22</td><td>$D_8$</td><td>SAMPLING PULSE</td><td>O</td><td>Timing pulse for envelope A/D conversion (sampling).</td></tr>
<tr><td>23</td><td>$\overline{\text{SRDY}}$</td><td>ATR LED</td><td>O</td><td>Outputs a "high" signal during ATR operation. Operating condition of this IC can be confirmed with the ATR LED indication.</td></tr>
<tr><td>24</td><td>CLK</td><td>SV S. CLK</td><td>I</td><td>Clock input for serial data transmission between this MPU, the system-control MPU and the servo IC.</td></tr>
<tr><td>25</td><td>SOUT</td><td>ATR DATA</td><td>O</td><td>Outputs the tracking value and the ATR operation indication signal to the system-control MPU as serial data.</td></tr>
<tr><td>26</td><td>SIN</td><td>SV S. DATA</td><td>I</td><td>Input for serial data signals transmitted between the system-control MPU, the servo IC and this MPU.</td></tr>
<tr><td>27</td><td>XOUT</td><td>XOUT</td><td>O</td><td rowspan="2">I/O terminal of the built-in clock circuit. Clock frequency is 4MHz.</td></tr>
<tr><td>28</td><td>XIN</td><td>XIN</td><td>I</td></tr>
<tr><td>29</td><td>CNTR</td><td></td><td></td><td>Not used</td></tr>
<tr><td>30</td><td>VDD</td><td></td><td></td><td>+5V</td></tr>
</table>

Table 2-16-1

## 2-17. TAPE REMAINING TIME CALCULATOR MPU (IC304)

### 2-17-1. Outline

This MPU performs tape type recognition and remaining time calculation on the basis of the VTR operating condition.

Tape recognition is performed by measuring the respective reel rotation periods from the supply and take-up reel pulses input to the MPU. These values are raised to second power, added, and then compared with values in the tape recognition table stored in the MPU built-in ROM.

Tape remaining time is calculated using the parameters (L : tape total length, r : reel hub diameter, t : tape thickness) determined by tape type recognition as explained above and the supply/take-up reel rotation period (measured from the reel pulse). As shown below, the peripheral circuits of this tape remaining time calculator MPU consist of the SSB line, which outputs the calculation results and the VTR operation mode input, and the calculation signal input (supply/take-up reel pulse) circuit, in a block configuration. The control pulse input from the servo section is used only for tape recognition, a stable tape transport during reel rotation period measurement being a necessary condition.

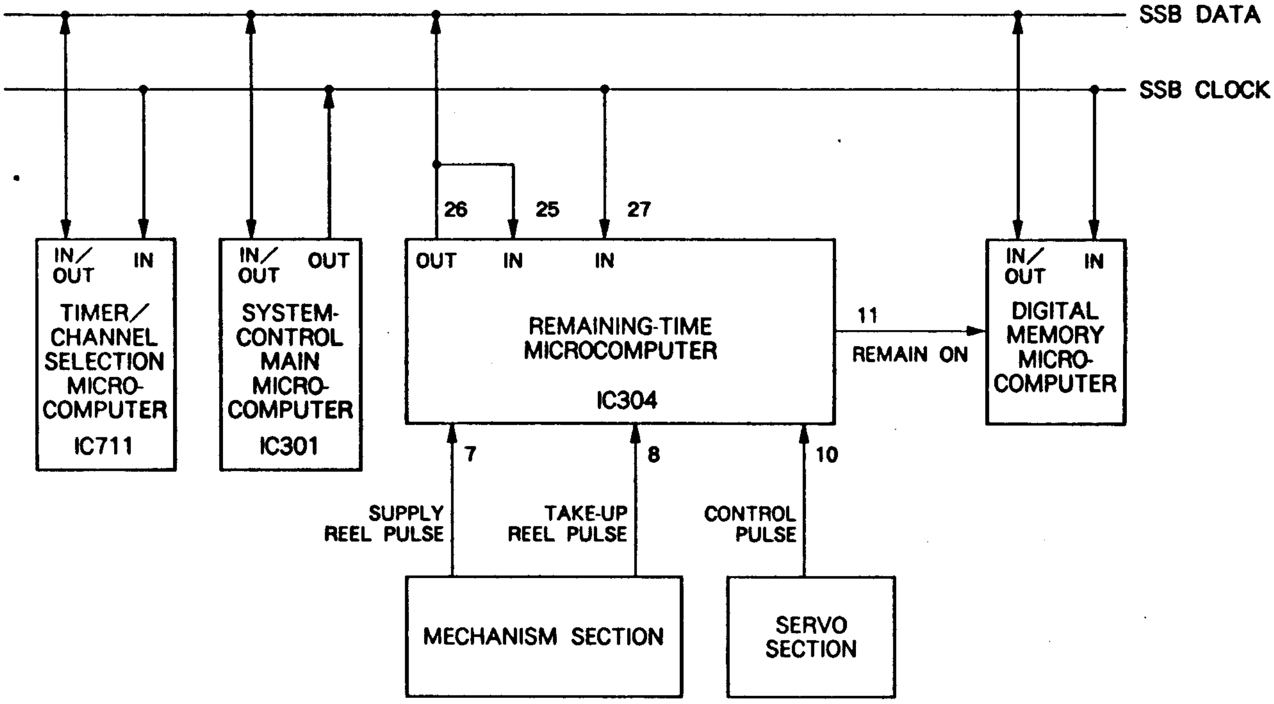

SSB DATA
SSB CLOCK
IN/OUT
IN
TIMER/CHANNEL SELECTION MICRO-COMPUTER
IC711
IN/OUT
OUT
SYSTEM-CONTROL MAIN MICRO-COMPUTER
IC301
26
25
27
OUT
IN
IN
REMAINING-TIME MICROCOMPUTER
IC304
11
REMAIN ON
IN/OUT
IN
DIGITAL MEMORY MICRO-COMPUTER
7
8
10
SUPPLY REEL PULSE
TAKE-UP REEL PULSE
CONTROL PULSE
MECHANISM SECTION
SERVO SECTION

Fig. 2-17-1

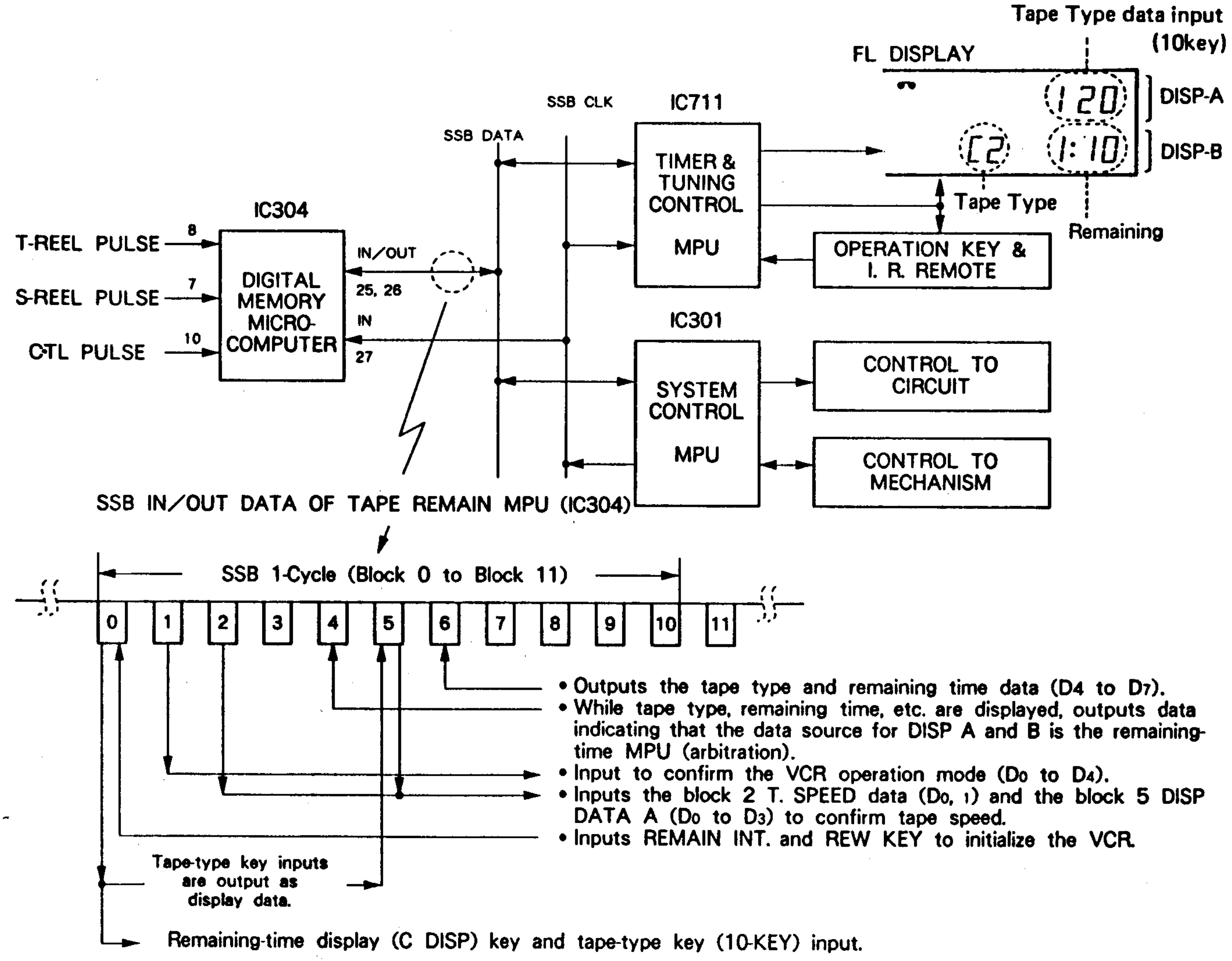
## 2-17-2. Table of MPU Pin Functions (IC304 : LC6521H-Series)

| Pin No. | Name | Input/Output Signal | I/O | Input/Output Function |
|---|---|---|---|---|
| 1 | PG$_2$ | | | Not used |
| 2 | PI$_0$ | WTEST | I | This pin is used for the MPU working test (ON/$\overline{OFF}$). Normal tape remaining time calculation is performed when "low", and the testing operation when "high". |
| 3 | PI$_1$ | PAL/NTSC | I | Signal for PAL/NTSC switching, recognized only when the MPU is reset. |
| 4 | PI$_2$ | PAL 15/7 | I | Input for PAL system LP mode F/R search speed commands. "high" for × 15 speed ; "low" for × 7 speed. |
| 5 | PI$_3$ | TAPE SPEED | I | Inputs tape speed data. |
| 6 | V$_{DD}$ | | | + 5V |
| 7 | PA$_0$ | SUP | I | The reel pulse (12 pulses/rotation) generated by the supply reel rotation is input here. This input is used for calculating the supply reel rotation period. The pulse period required for recognition is approx. 3msec to 2sec. |
| 8 | PA$_1$ | TAK | I | The reel pulse (12 pulses/rotation) generated by the take-up reel rotation is input here. This input is used for calculating the take-up reel rotation period. The pulse period required for recognition is approx. 3msec to 2sec. |
| 9 | PA$_2$ | FL STOP SW | I | Signal for "cassette-in" recognition. |
| 10 | PA$_3$ | CTL P. | I | Signal used for determining whether tape transport is stable while supply and take-up reel rotation periods are being measured for tape type recognition.<br>The pulse period required for recognition is approx. 2msec. |
| 11 | PC$_0$ | REMAIN ON | O | This signal becomes "high" for the MPU initialize calculation operation. |
| 12 | PC$_1$ | | | Not used (Together with the PC0 at Pin 11, this pin outputs a pulse at periods of 80 to 120msec when WTEST input is "high"). |
| 13 | PC$_2$ | | | |
| 14 | PC$_3$ | | | |
| 15 | PD$_0$ | | | Not used |
| 16 | PD$_1$ | | | |
| 17 | PD$_2$ | | | |
| 18 | PD$_3$ | | | |
| 19 | PE$_0$ | | | |
| 20 | TEST | | | |
| 21 | V$_{SS}$ | | | GND |
| 22 | OSC1 | | | Supplies the MPU clock oscillation signal. Clock frequency is 4MHz. |
| 23 | OSC2 | | | |
| 24 | $\overline{RES}$ | $\overline{RESET}$ | I | Reset input. |
| 25 | SI | S. IN | I | For data transmission with the SSB. |
| 26 | SO | S. OUT | O | |
| 27 | $\overline{SCK}$ | S. CLK | I | Clock input from SSB. |
| 28 | $\overline{INT}$ | | | Not used |
| 29 | PG$_0$ | | | |
| 30 | PG$_1$ | | | |

Table 2-17-1

### 2-17-3. SSB Input/Output Data

As shown below, the remaining tape time calculating MPU (IC304) uses the SSB line to perform exchange of operation key data, operation mode data and other input data, as well as remaining time calculation results, tape type determining data and other output data, between the timer MPU (IC711) and the system control MPU (IC301). Blocks 0, 1, 2, 4, 5 and 6 in the figure are used for SSB data. For details on their contents, refer to each block's description in sections 2-3. through 2-9.


Tape Type data input
(10key)
FL DISPLAY
120
DISP-A
C2
1:10
DISP-B
Tape Type
Remaining
SSB CLK
IC711
SSB DATA
TIMER &
TUNING
CONTROL
MPU
OPERATION KEY &
I. R. REMOTE
IC304
T-REEL PULSE
8
S-REEL PULSE
7
CTL PULSE
10
DIGITAL
MEMORY
MICRO-
COMPUTER
IN/OUT
25, 26
IN
27
IC301
SYSTEM
CONTROL
MPU
CONTROL TO
CIRCUIT
CONTROL TO
MECHANISM
SSB IN/OUT DATA OF TAPE REMAIN MPU (IC304)
SSB 1-Cycle (Block 0 to Block 11)
0
1
2
3
4
5
6
7
8
9
10
11

- Outputs the tape type and remaining time data ($D_4$ to $D_7$).
- While tape type, remaining time, etc. are displayed, outputs data indicating that the data source for DISP A and B is the remaining-time MPU (arbitration).
- Input to confirm the VCR operation mode ($D_0$ to $D_4$).
- Inputs the block 2 T. SPEED data ($D_{0,1}$) and the block 5 DISP DATA A ($D_0$ to $D_3$) to confirm tape speed.
- Inputs REMAIN INT. and REW KEY to initialize the VCR.

Tape-type key inputs are output as display data.

Remaining-time display (C DISP) key and tape-type key (10-KEY) input.

Fig. 2-17-2

### 2-17-4. Cassette Type Determination

Cassette type is automatically determined for cassettes bearing the "O" (AUTO ID) mark as shown in the table 2-17-2. For other cassettes, a precise remaining time reading can be obtained by entering the respective cassette number (example : input 195 for E195) with the numerical keys. First, press the C.DISP (Change Display) key. Then, enter the cassette number (see example above) with the numerical keys, and press the "→" key (this should be done while the cassette type indicator is flashing ; about 5 seconds).

Cassette type and remaining time are indicated on the lower row (DISP B) of the fluorescent display as shown in the figure. Cassette type indications differ according to tape speed (SP/LP) as shown in the table 2-17-2.

| Auto ID | Cassette | Cassette number | Cassette type display | |
|---|---|---|---|---|
| | | | SP mode | LP mode |
| O | E-30 | 30 | 03 | C1 |
| O | E-60 | 60 | C1 | C2 |
| O | E-90 | 90 | 09 | C3 |
| O | E-120 | 120 | C2 | C4 |
| O | E-150 | 150 | 15 | C5 |
| O | E-180 | 180 | C3 | C6 |
| | E-195 | 195 | 19 | 38 |
| | E-210 | 210 | 21 | C7 |
| O | E-240 | 240 | C4 | C8 |

Table 2-17-2

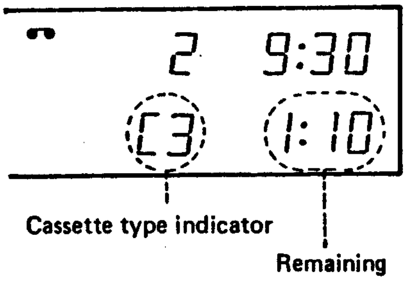


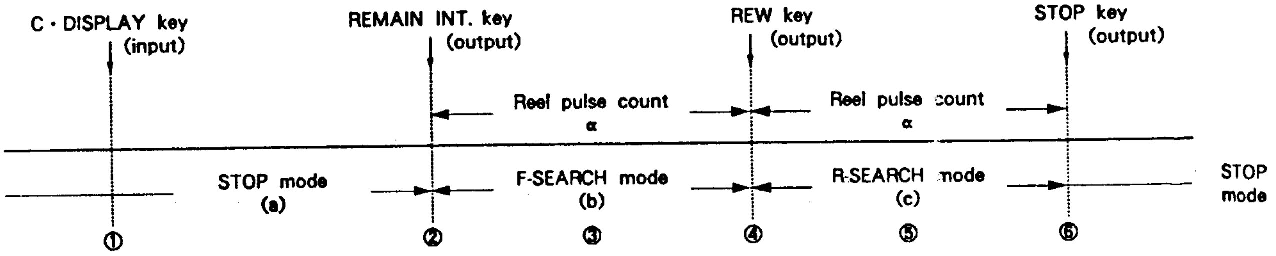
Fig. 2-17-3

### 2-17-5. Initialize Operation

The remaining tape calculating MPU is initialized when the cassette is replaced (removed and loaded again), and the internal remaining time value reset to zero. If a tape transport operation (playback, etc.) is performed in this condition, tape type determination and remaining time calculation are started. However, the following initialize operation can be performed before running the tape.

[Initialize Operation]

In the STOP mode, with no calculation result i the remaining tape calculating MPU and th fluorescent display showing the counter readin simply press the C.DISP key, and the followin initialize operation will be executed.



①Initialize operation starts when the C.DISP key is pressed under the above conditions.
②Upon receiving of the C.DISP key entry, the KEY RELEASE key and REMAIN INT. key signals are output.
③The reel pulse is counted since the F.SEARCH mode is set until remaining time calculation is finished.
④When remaining time calculation is finished the result is displayed, and simultaneously the KEY RELEASE key, NO KEY and REW key signals are output in succession.
⑤The reel pulse count starts again after entering the R-SEARCH mode.
⑥KEY RELEASE key and STOP key signals are output at the point where the reel pulse count in the R-SEARCH mode ("α" in the above figure) equals that in the F-SEARCH mode.

Fig. 2-17-4

## 2-18. TIMER AND TUNING CONTROL MPU (IC711)

### 2-18-1. Outline

This MPU confirms VCR operation key inputs, timer program key inputs, tuning operation key inputs and data input from the IR remote control, including the mentioned operations. VCR operation data are sent to the system control MPU through the SSB line, then operation control is performed. Tuner station selection is controlled by data signal connection of the MPU built-in digital voltage synthesizer or digital PLL tuning system circuit with the tuner block and the IF block.

VCR operating conditions are indicated by numerical figures or graphics on the 9-grid, 15-segment fluorescent display. The display signal (grid/segment) is output from this MPU by the dynamic indicating system. Furthermore, the display command is output not only from this MPU, also from the other MPUs through the SSB line.

Main functions are listed below.

- Timer programming : 8 programs/year
- VPS timer programming compat. : Max. 52-h standby
- Clock display : Displayed 24 hours a day
- Channel display : Numbers on 2 lines (position display), 39 positions
- Counter display : Switchable between linear time counter, remaining tape time and VASS address
- Search functions : GOTO search/INDEX search /Address search
- Special functions (key lock, etc.) compatibility
- Remote control decoder function : Timer programming, clock adjustment, special functions setting, search functions setting and setting of other standard functions by infrared transmission remote control.

A block diagram of the peripheral circuits of this MPU is given below.

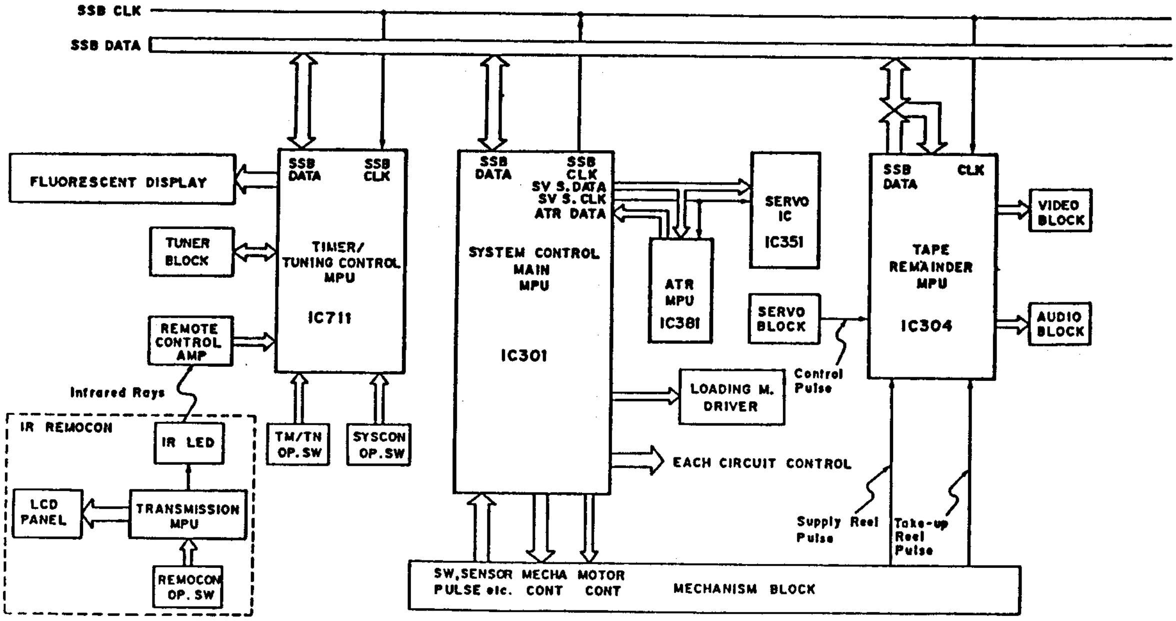

SSB CLK
SSB DATA
FLUORESCENT DISPLAY
TUNER BLOCK
REMOTE CONTROL AMP
Infrared Rays
IR REMOCON
IR LED
LCD PANEL
TRANSMISSION MPU
REMOCON OP. SW
SSB DATA
SSB CLK
TIMER/ TUNING CONTROL MPU
IC711
TM/TN OP. SW
SYSCON OP. SW
SSB DATA
SSB CLK
SV S. DATA
SV S. CLK
ATR DATA
SYSTEM CONTROL MAIN MPU
IC301
ATR MPU
IC381
SERVO IC
IC351
SERVO BLOCK
Control Pulse
LOADING M. DRIVER
EACH CIRCUIT CONTROL
SSB DATA
CLK
TAPE REMAINDER MPU
IC304
VIDEO BLOCK
AUDIO BLOCK
Supply Reel Pulse
Take-up Reel Pulse
SW, SENSOR PULSE etc.
MECHA CONT
MOTOR CONT
MECHANISM BLOCK

Fig. 2-18-1

## 2-18-2. MPU Pin Functions

### a. Used for Voltage Synthesizer Tuning System Models (IC711 : M50957/M50959 series)

| Pin No. | Name | Input/Output Signal | I/O | Input/Output Function |
|---|---|---|---|---|
| 1 | Vcc | | | + 5V |
| 2 | P6$_5$ | AV | O | "H" output when an external input is received. |
| 3 | P6$_4$ | SC | O | "H" during simulcast. |
| 4 | P6$_3$/PWM3 | BAND1 | O | Band data output (BAND1, BAND2) |
| 5 | P6$_2$/PWM2 | BAND2 | O | (L, L) = VHF-LOW (L, H) = VHF-HIGH (H, L) = UHF (H, H) = SKIP |
| 6 | P6$_1$/PWM1 | PWM | O | Tuning voltage output. |
| 7 | P6$_0$/T | ADJUST OSD CS | O | Pulse output (6.29MHz/128) for frequency adjustment.<br>"L" output during ON-SCREEN IC selection. |
| 8 | P2$_7$ | $\overline{\text{CLK}}$ | O | Clock pulse output to the $E^2$ PROM or the OSD IC. |
| 9 | P2$_6$ | DI | I/O | Data exchange with the $E^2$ PROM or the OSD IC. |
| 10 | P2$_5$ | $\overline{E^2\text{ PROM CS1}}$ | O | $E^2$ PROM 1 is accessed when "L". |
| 11 | P2$_4$ | BC/$\overline{\text{L}}$ | O | Transmission system switching ("H" = PAL BC ; "L" = SECAM L). |
| 12 | P2$_3$ | BLUE B. "H" | O | "H" output during blue back. |
| 13 | P2$_2$ | TUNER ON | O | "H" output when tuner power is ON. |
| 14 | P2$_1$ | $\overline{\text{AUDIO MUTE}}$ | O | "L" output during AUDIO MUTE. |
| 15 | P2$_0$ | AFT MUTE | O | "H" output during AFT MUTE. |
| 16 | P3$_7$/$\overline{\text{Srdy}}$ | $\overline{E^2\text{ PROM CS2}}$ | O | $E^2$ PROM 2 (for titles) is accessed at "L" output. |
| 17 | P3$_6$/CLK | $\overline{\text{S.CLK}}$ | I | SSB clock pulse input. |
| 18 | P3$_5$/Sout | $\overline{\text{S.OUT}}$ | O | SSB data output. |
| 19 | P3$_4$/Sin | S.IN | I | SSB data input. |
| 20 | P3$_3$/ANin | AFT.C | I | AFT.S curve input. |
| 21 | P3$_2$/CNTR | H.SYNC | I | Horizontal sync signal input. |
| 22 | P3$_1$ | SCL | O | Clock pulse output to the VPS decoder IC. |
| 23 | P3$_0$ | SDA | I/O | Data exchange with the VPS decoder IC. |
| 24 | P5$_3$/INT$_1$ | $\overline{\text{POWER DOUN}}$ | I | Power failure mode set at "L" input. |
| 25 | P5$_2$/INT$_2$ | REMOCON | I | Remote control signal input. |
| 26 | CNVss | | | Ground. |
| 27 | $\overline{\text{RESET}}$ | | | Reset terminal. |
| 28 | Xin | | | 6.291456MHz |
| 29 | Xout | | | |
| 30 | Xcin | | | 32.768kHz (clock pulse used in the power failure mode) |
| 31 | Xcout | | | |
| 32 | Vss | | | Ground |
| 33 | $\phi$ | | | |
| 34 | P5$_7$ | KEY IN4 | I | Key inputs |
| 35 | P5$_6$ | KEY IN3 | I | |
| 36 | P5$_5$ | KEY IN2 | I | |
| 37 | P5$_4$ | KEY IN1 | I | |
| 38 | Vp | Vp | | -30V |
| 39 | P5$_1$ | STEREO R | O | "H" output when the STEREO R LED is lights up. |
| 40 | P5$_0$ | STEREO L | O | "H" output when the STEREO L LED is lights up. |
| 41 | P1$_7$ | o | O | Display segment outputs.<br>(Included key-scan output) |
| 42 | P1$_6$ | n | O | |
| 43 | P1$_5$ | m | O | |
| 44 | P1$_4$ | l | O | |
| 45 | P1$_3$ | k | O | |
| 46 | P1$_2$ | j | O | |
| 47 | P1$_1$ | i | O | |
| 48 | P1$_0$ | C9 | O | Display grid outputs. |
| 49 | P0$_7$ | C8 | O | |
| 50 | P0$_6$ | C7 | O | |
| 51 | P0$_5$ | C6 | O | |
| 52 | P0$_4$ | C5 | O | |
| 53 | P0$_3$ | C4 | O | |
| 54 | P0$_2$ | C3 | O | |
| 55 | P0$_1$ | C2 | O | |
| 56 | P0$_0$ | C1 | O | |
| 57 | P4$_7$ | h | O | Display segment outputs.<br>(Included key-scan output) |
| 58 | P4$_6$ | g | O | |
| 59 | P4$_5$ | f | O | |
| 60 | P4$_4$ | e | O | |
| 61 | P4$_3$ | d | O | |
| 62 | P4$_2$ | c | O | |
| 63 | P4$_1$ | b | O | |
| 64 | P4$_0$ | a | O | |

**Table 2-18-1 (a)**

## b. Used for PLL Frequency Synthesizer Tuning System Models (IC711 : M50959-102SP)

| Pin No. | Name | Input/Output Signal | I/O | Input/Output Function |
|---|---|---|---|---|
| 1 | Vcc | | | +5V |
| 2 | P6$_5$ | AV | O | "H" output when an external input is received. |
| 3 | P6$_4$ | SC | O | "H" output during simulcast. |
| 4 | P6$_3$/PWM3 | PLL CLK | O | PLL IC (TD6538N) clock pulse output. |
| 5 | P6$_2$/PWM2 | PLL DATA | O | PLL IC (TD6538N) data output. |
| 6 | P6$_1$/PWM1 | PLL CE | O | PLL IC (TD6538N) chip enable output. |
| 7 | P6$_0$/T | ADJUST | O | Pulse output for frequency modulation (6.29MHz/128). |
| 8 | P2$_7$ | $\overline{\text{E}^2\text{ PROM CLK}}$ | O | Clock pulse output to E$^2$ PROM. |
| 9 | P2$_6$ | E$^2$ PROM DI | I/O | Data exchange with E$^2$ PROM. |
| 10 | P2$_5$ | $\overline{\text{E}^2\text{ PROM CS}}$ | O | E$^2$ PROM chip select output. |
| 11 | P2$_4$ | BC/$\overline{\text{L}}$ | O | Transmission system switching ("H" = PAL BC ; "L" = SECAM L). |
| 12 | P2$_3$ | | | Not used. |
| 13 | P2$_2$ | TUNER ON | O | "H" output when tuner power is ON. |
| 14 | P2$_1$ | AUDIO MUTE | O | "L" output during audio mute. |
| 15 | P2$_0$ | | | Not used. |
| 16 | P3$_7$/$\overline{\text{Srdy}}$ | | | Not used. |
| 17 | P3$_6$/CLK | $\overline{\text{S.CLK}}$ | I | SSB clock pulse input. |
| 18 | P3$_5$/Sout | $\overline{\text{S.OUT}}$ | O | SSB data output. |
| 19 | P3$_4$/Sin | $\overline{\text{S.IN}}$ | I | SSB data input. |
| 20 | P3$_3$/ANin | AFT-S | I | AFT-S curve input. |
| 21 | P3$_2$/CNTR | H-SYNC | I | Horizontal sync signal input. |
| 22 | P3$_1$ | SCL | O | Clock pulse output to the VPS decoder IC. |
| 23 | P3$_0$ | SOA | I/O | Data exchange with the VPS decoder IC. |
| 24 | P5$_3$/$\overline{\text{INT}_1}$ | $\overline{\text{POWER DOUN}}$ | I | Power failure mode set at "L" input. |
| 25 | P5$_2$/$\overline{\text{INT}_2}$ | REMOCON | I | Remote control signal input. |
| 26 | CNVss | | | Ground. |
| 27 | $\overline{\text{RESET}}$ | | | Reset terminal. |
| 28 | Xin | | | 6.291456MHz (normal clock pulse) |
| 29 | Xout | | | |
| 30 | Xcin | | | 32.768kHz (power failure backup clock pulse) |
| 31 | Xcout | | | |
| 32 | Vss | | | Ground |
| 33 | ♦ | | | |
| 34 | P5$_7$ | KEI IN4 | I | Key input |
| 35 | P5$_6$ | KEI IN3 | I | |
| 36 | P5$_5$ | KEI IN2 | I | |
| 37 | P5$_4$ | KEI IN1 | I | |
| 38 | VP | | | -30V |
| 39 | P5$_1$ | STEREO R | O | "H" output when the STEREO R LED is lights up. |
| 40 | P5$_0$ | STEREO L | O | "H" output when the STEREO L LED is lights up. |
| 41 | P1$_7$ | o | O | Display segment outputs.<br>(Included key-scan output) |
| 42 | P1$_6$ | n | O | |
| 43 | P1$_5$ | m | O | |
| 44 | P1$_4$ | l | O | |
| 45 | P1$_3$ | k | O | |
| 46 | P1$_2$ | j | O | |
| 47 | P1$_1$ | i | O | |
| 48 | P1$_0$ | C9 | O | Display grid outputs. |
| 49 | P0$_7$ | C8 | O | |
| 50 | P0$_6$ | C7 | O | |
| 51 | P0$_5$ | C6 | O | |
| 52 | P0$_4$ | C5 | O | |
| 53 | P0$_3$ | C4 | O | |
| 54 | P0$_2$ | C3 | O | |
| 55 | P0$_1$ | C2 | O | |
| 56 | P0$_0$ | C1 | O | |
| 57 | P4$_7$ | h | O | Display segment outputs.<br>(Included key-scan output) |
| 58 | P4$_6$ | g | O | |
| 59 | P4$_5$ | f | O | |
| 60 | P4$_4$ | e | O | |
| 61 | P4$_3$ | d | O | |
| 62 | P4$_2$ | c | O | |
| 63 | P4$_1$ | b | O | |
| 64 | P4$_0$ | a | O | |

**Table 2-18-1 (b)**

### 2-18-3. Input Functions of the Operation Keys

Key input recognition is performed through the input of the key scan signals selected at the key matrix circuit shown below to the respective KEY IN ports (0 to 3). The key scan signals, incorporated to the blanking period of the display segment signals (SIG a to o), have a pulse amplitude of 0.4msec, a cycle of 3.3msec, and are out of phase with regard to each other. Key input identification is performed on the basis of this phase difference.

KEY IN 0 (Pin 37), connected through a diode, is used for identification of the VCR functions. Namely, it is the function setting input for each model.

At this MPU, the result of key input recognition is converted to key data as shown in the SSB system BLOCK 0 (page 5), and the corresponding operation command is executed. Incidentally, IR remote control signals are also converted to BLOCK 0 key data after decoding.

Key Input Circuit

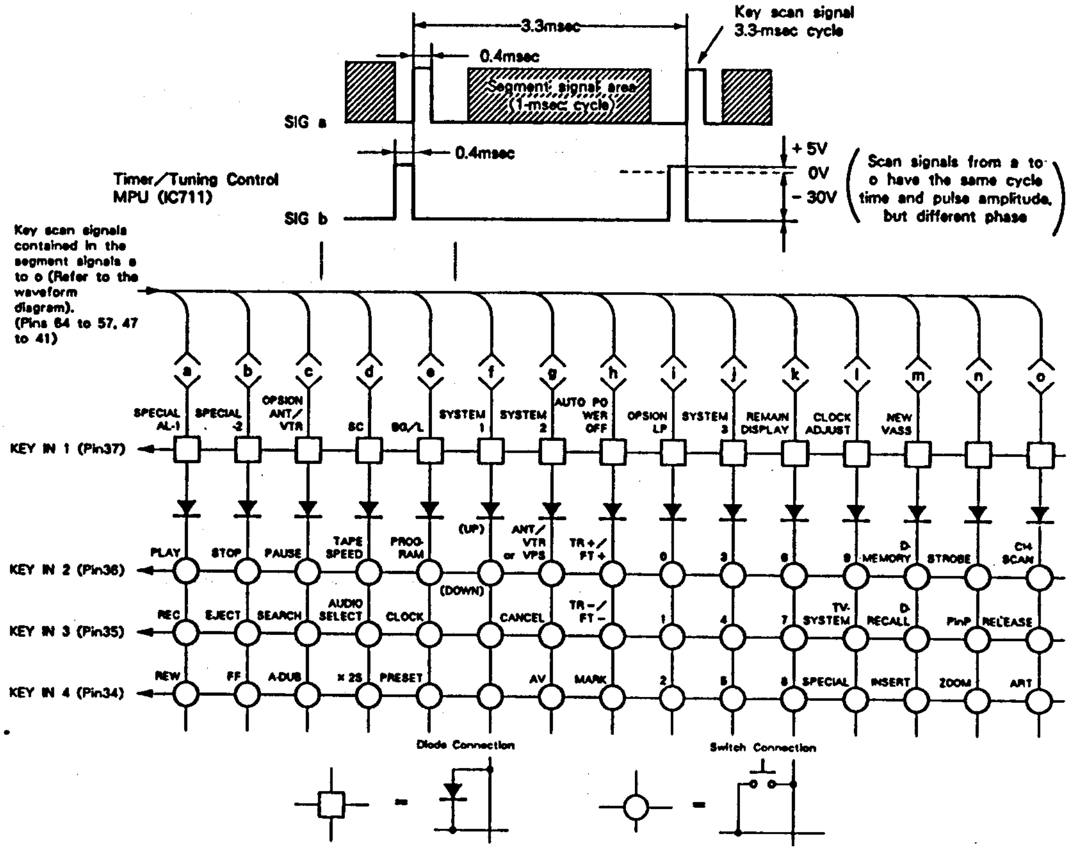
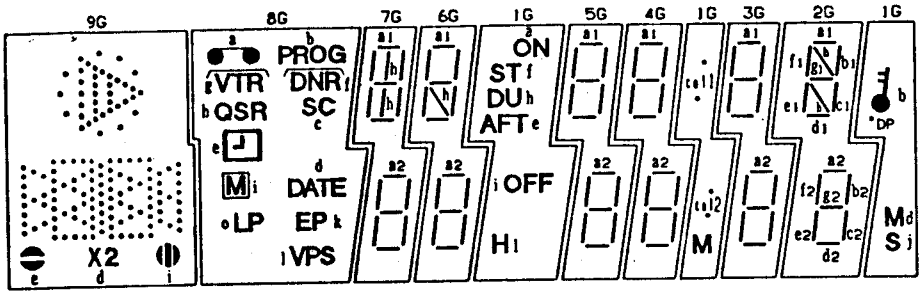

3.3msec
Key scan signal 3.3-msec cycle
0.4msec
Segment signal area (1-msec cycle)
SIG a
0.4msec
+5V
0V
-30V
Scan signals from a to o have the same cycle time and pulse amplitude, but different phase
Timer/Tuning Control MPU (IC711)
SIG b
Key scan signals contained in the segment signals a to o (Refer to the waveform diagram). (Pins 64 to 57, 47 to 41)
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
SPECIAL AL-1
SPECIAL -2
OPSION ANT/ VTR
SC
SG/L
SYSTEM 1
SYSTEM 2
AUTO PO WER OFF
OPSION LP
SYSTEM 3
REMAIN DISPLAY
CLOCK ADJUST
NEW VASS
KEY IN 1 (Pin37)
(UP)
PLAY
STOP
PAUSE
TAPE SPEED
PROG-RAM
ANT/ VTR or VPS
TR+/ FT+
0
3
6
9
D-MEMORY
STROBE
CH-SCAN
KEY IN 2 (Pin36)
(DOWN)
REC
EJECT
SEARCH
AUDIO SELECT
CLOCK
CANCEL
TR-/ FT-
1
4
7
TV-SYSTEM
D-RECALL
PinP
RELEASE
KEY IN 3 (Pin35)
REW
FF
A-DUB
× 2S
PRESET
AV
MARK
2
5
8
SPECIAL
INSERT
ZOOM
ART
KEY IN 4 (Pin34)
Diode Connection
Switch Connection
=
=

Fig. 2-18-2

### 2-18-4. Display Functions of the Fluorescent Display (FLD)

The fluorescent display has 9 grids and 15 segments, whose layout and connection are shown in the figure next page. The display outputs the signal corresponding to the segment to be lighted up, within the required grid pulse amplitude, according to the grid signals shown in the figure 2-18-5 (cycle 11msec, pulse amplitude 1msec, different phases as seen in the waveform diagram). This is referred to as the dynamic lighting system. For details on the segment signal, refer to the key scan signal waveform above Fig. 2-18-2.

## 1. GRID／SEGMENT ASIGMENT


9G
8G
7G
6G
1G
5G
4G
1G
3G
2G
1G
PROG
VTR
DNR
QSR
SC
DATE
LP
EP
VPS
X2
ON
ST
DU
AFT
OFF
H
M
M
S
DP

DISPLAY A／ (GRAPHIC)
(CH, CLOCK, TIMER & GRAPHIC)
(TAPE TYPE INPUT No.)

(DISPLAY B : DATE, TIMER,
COUNTER, TAPE REMAIN)

| PIN CONNECTION | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F1 | F1 | NP | o | n | 9G | m | l | k | j | 8G | i | g | h | 7G | NP | 6G | NP | f | NP | NP | 5G | NP | e | 4G | d | NP | c | 3G | b | 2G | a | 1G | NP | F2 | F2 |

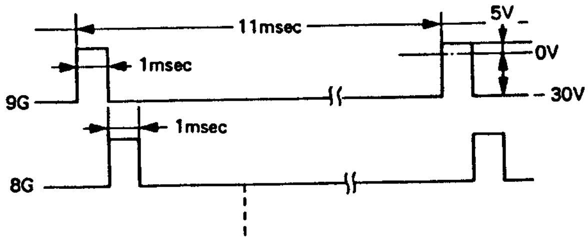
Fig. 2-18-3

## 2. ANODE CONNECTION

| | 9G | 8G | 7G | 6G | 5G | 4G | 3G | 2G | 1G |
|---|---|---|---|---|---|---|---|---|---|
| a | B | ● ● | a1 | a1 | a1 | a1 | a1 | a1 | ON |
| b | . A | PROG. | b1 | b1 | b1 | b1 | b1 | b1 | 🌡 |
| c | - | SC | c1 | c1 | c1 | c1 | c1 | c1 | DP |
| d | ×2 | DATE | d1 | d1 | d1 | d1 | d1 | d1 | M(1) |
| e | ⊖ | ⊡ | e1 | e1 | e1 | e1 | e1 | e1 | AFT |
| f | C | DNR | f1 | f1 | f1 | f1 | f1 | f1 | ST |
| g | D | VTR | g1 | g1 | g1 | g1 | g1 | g1 | col'1 |
| h | - | OSR | / | \ | - | - | - | \ | DU |
| i | ◍ | 🄼 | a2 | a2 | a2 | a2 | a2 | a2 | OFF |
| j | E | - | b2 | b2 | b2 | b2 | b2 | b2 | S |
| k | I | EP | c2 | c2 | c2 | c2 | c2 | c2 | - |
| l | H | VPS | d2 | d2 | d2 | d2 | d2 | d2 | H |
| m | J | - | e2 | e2 | e2 | e2 | e2 | e2 | M(2) |
| n | F | - | f2 | f2 | f2 | f2 | f2 | f2 | - |
| o | G | LP | g2 | g2 | g2 | g2 | g2 | g2 | col'2 |

Table 2-18-2

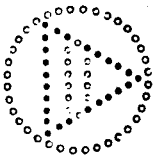
## 4. GRID SIGNAL WAVEFORM


11msec
5V
0V
1msec
9G
-30V
1msec
8G

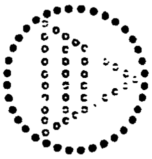
(Gred signals from 1G to 9G have the same cycle time and pulse amplitude, but different phase.)

Fig. 2-18-5

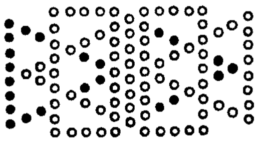
## 3. 9G : GRAPHIC MODE DISPLAY



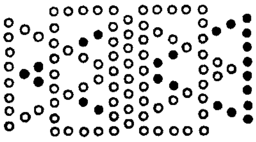
Pattern A



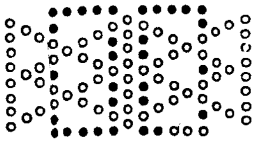
Pattern B



Pattern E

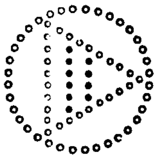


Pattern F

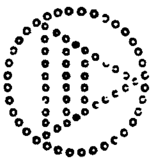


Pattern G

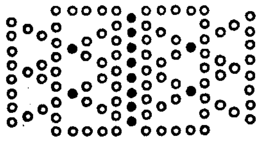
(• : FLD ON)



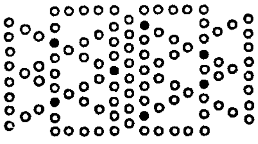
Pattern C



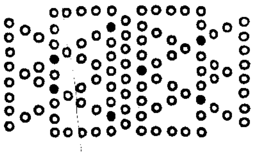
Pattern D



Pattern H



Pattern I



Pattern J

Fig. 2-18-4

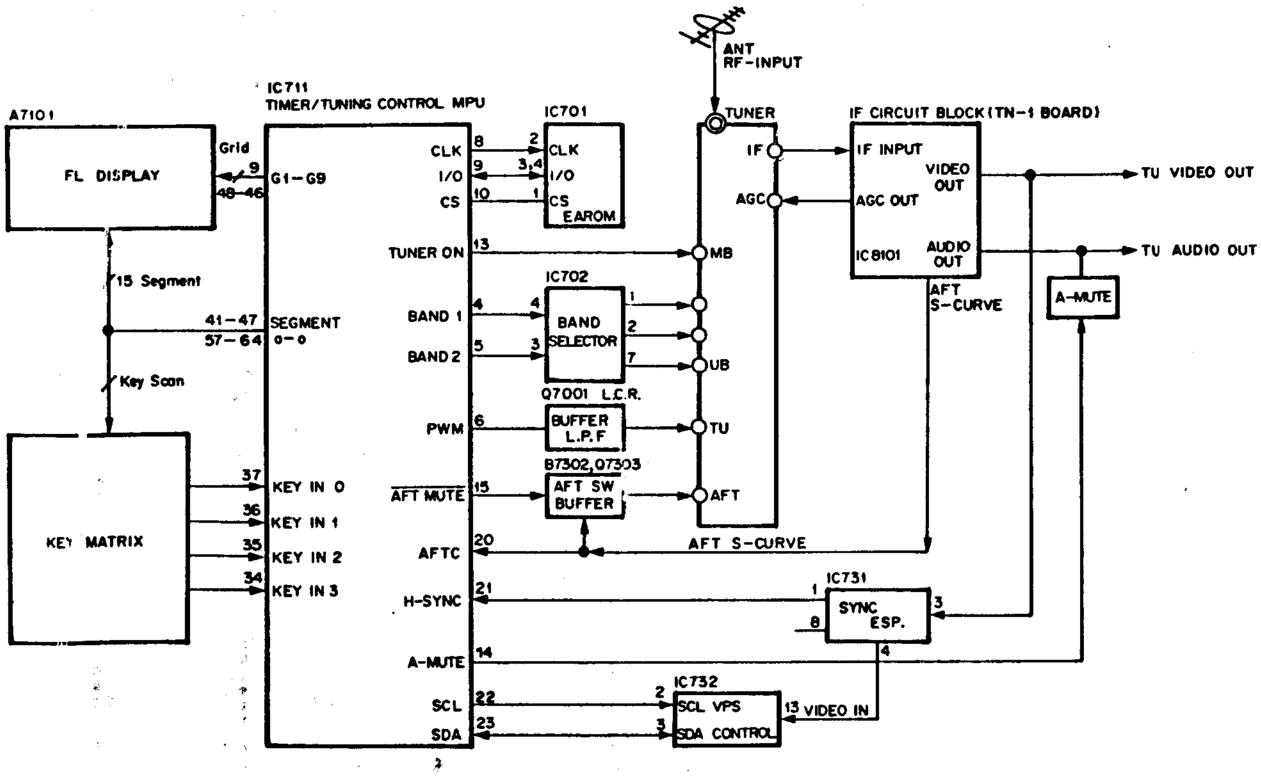
### 2-18-5. Channel Selection Function

A basic circuit block diagram of the channel selection system is shown below. This system is composed of the following circuits, with the IC711 timer/tuning control MPU as its main part.

- KEY MATRIX : Channel selection command.
- FLUORESCENT (FL) DISPLAY : Shows channel selection results.
- EAROM (IC701) : Memorizes the selected channel data and tuning voltage data.
- BAND SELECTOR (IC702) : Converts 2-bit band data into 3-band (LB/HB/UB) signals.
- LPF (Q7001 peripheral circuit) : Converts to DC voltage the tuning voltage output as a PWM signal.
- AFT SWITCH : Turns the tuner AFT function ON and OFF.
- SYNC SEPARATOR (IC731) : Separates the selected channel video signal into horizontal and vertical sync signals. These sync signals are input to the tuning control MPU as channel presence/absence determining signals during channel selection.

The tuner is controlled through these peripheral circuits to execute channel selection.

Basic Circuit Block Diagram of the Channel Selection System



A7101
FL DISPLAY
Grid
9
48–46
15 Segment
41–47
57–64
Key Scan
KEY MATRIX
37
36
35
34
IC711
TIMER/TUNING CONTROL MPU
G1–G9
SEGMENT
o–o
KEY IN 0
KEY IN 1
KEY IN 2
KEY IN 3
CLK
I/O
CS
TUNER ON
BAND 1
BAND 2
PWM
AFT MUTE
AFTC
H-SYNC
A-MUTE
SCL
SDA
8
9
10
13
4
5
6
15
20
21
14
22
23
IC701
2
3,4
1
CLK
I/O
CS
EAROM
IC702
BAND SELECTOR
4
3
1
2
7
Q7001 L.C.R.
BUFFER
L.P.F
B7302,Q7303
AFT SW
BUFFER
AFT S-CURVE
ANT
RF-INPUT
TUNER
IF
AGC
MB
UB
TU
AFT
IF CIRCUIT BLOCK (TN-1 BOARD)
IF INPUT
VIDEO OUT
AGC OUT
IC8101
AUDIO OUT
AFT
S-CURVE
TU VIDEO OUT
TU AUDIO OUT
A-MUTE
IC731
SYNC
ESP.
1
8
3
4
IC732
SCL VPS
SDA CONTROL
2
3
13 VIDEO IN

Fig. 2-18-6

1. System Features

① Voltage synthesizer system, allowing for 39-position presetting.

② The SKIP condition can be memorized for each position.

③ Channel presetting is possible through the semi-auto search system.

④ Tuning voltage is shown on the fluorescent display (FLD) during presetting.

⑤ Equipped with fine tuning and fine tuning reset functions.

2. Tuning Operation for Presetting

When each channels are preset using the semi-auto search function, the optimum tuning point is automatically detected by the H-SYNC signal from Pin 21 and AFT.S curve signal from Pin 20 of the MPU.

The optimum tuning point is the area where the H-SYNC signal from Pin 21 is present and a descending slope of the AFT.S signal voltage curve crosses the range from 5/16 to 10/16 VDD as shown in the figure below.

**[AFT.S curve voltage]**

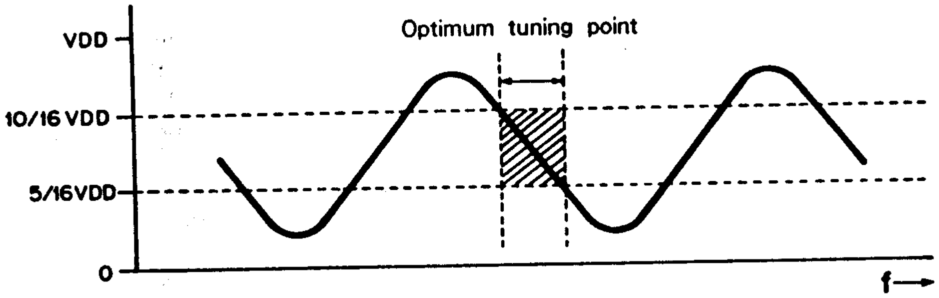


Fig. 2-18-7

Whether the selected channel is occupied or not by a station is determined by counting the H-SYNC signals separated from the video signal of the selected channel. H-SYNC signals are input to Pins 21 of the MPU. This causes only occupied channels to be preset.

Channel preset data (channel data, tuning voltage data, band data, skip data and AFT ON/OFF data) are memorized in the IC701 EAROM as the data corresponding to each position.

Normal channel selection is executed immediately by read-out of the ROM data in the position specified by key operation.

3. Band Data

Band data is output from the MPU in 2-bit units.

- Pin 4 : Band 1
- Pin 5 : Band 2

This 2-bit data is converted by IC702 into the respective VL/VH/U band signals shown in the table. Tuner band selection is performed by means of these signals.

| | BAND 1 | BAND 2 |
|---|---|---|
| VL | L | L |
| VH | L | H |
| U | H | L |

Table 2-18-3

# 3. VIDEO CIRCUIT SYSTEM

The video circuit is composed of IC101 (LA7322), which performs luminance signal (Y) recording and playback processing, and IC121 (TA8632), which performs chroma signal (C) recording and playback processing. These two ICs, mounted on the VD-1 board, constitute the the main Y/C circuit. Since the processed Y/C signal passes through the video head before being recorded on the tape, it should go through IC181 (VP-1 board), which includes a current amplifier circuit for recording. On the other hand, during playback the microsignal reproduced at the video head is preamplified at IC181 (VP-1 board) to a level that allows demodulation, then it passes through the switching circuit, which makes the playback signals of the each heads (channels 1 and 2) into a continuous signal, and it is sent to the above-mentioned Y/C processing circuit (VD-1 board).

## 3-1. LUMINANCE SIGNAL PROCESSING IC (IC101, LA7322)

Incorporating a detail enhancer, a line noise canceller, etc., this IC is compatible with the HQ (High Quality) system. It does not require E/E level and white/dark clip level adjustment, allowing for simpler peripheral circuits.

**(1) Functions**

Recording-related Functions

- Automatic gain control for the video input signal
- Detail enhancer (compatible with the HQ system)
- Nonlinear emphasis (OFF in the SP mode)
- Main emphasis
- White / dark clip (no adjustment required, compatible with the HQ system)
- Frequency modulation
- FM 1/2 fH carrier shift (OFF in the SP mode)

Playback-related Functions

- Automatic gain control for the playback FM signal
- Dropout compensation
- Double limiter for the FM signal
- Frequency demodulation
- Dynamic deemphasis
- Line noise canceller (combined with CCH 1H DL)
- Noise canceller
- Sync signal extension
- Y/C mix
- Mute or dummy V insertion
- White peak clip
- Picture control
- Playback dark clip

Functions Related to Both Recording and Playback

- Sync separation
- Sync tip clamp
- Feedback clamp (FBC)
- 75 Ω video output driver

**(2) Main Peripheral Circuits of IC101 (LA7322)**
Figs. 3-1 and 3-2 show the internal blocks of IC101 (LA7322) and the layout of its peripheral circuits for luminance signal processing, respectively.
The names of IC101 (LA7322) pins are listed on Table 3-1. Table 3-2 is an IC mode switching control table.

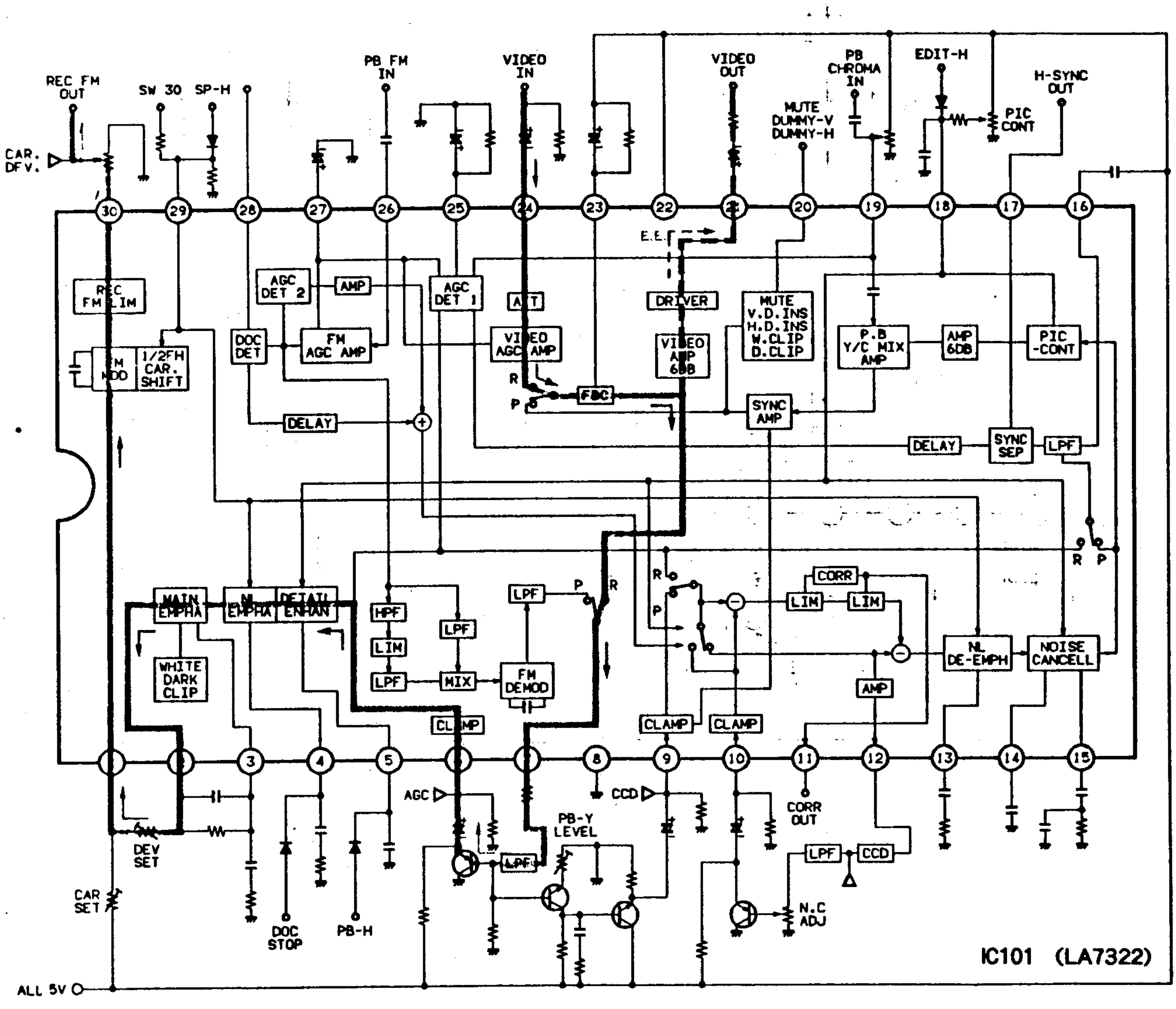

REC FM OUT
SW 30
SP-H
CAR. DEV.
PB FM IN
VIDEO IN
VIDEO OUT
PB CHROMA IN
EDIT-H
H-SYNC OUT
MUTE DUMMY-V DUMMY-H
PIC CONT
REC FM LIM
FM MOD
1/2FH CAR. SHIFT
AGC DET 2
AMP
FM AGC AMP
DOC DET
AGC DET 1
ATT
VIDEO AGC AMP
R
P
FBC
DELAY
E.E.
DRIVER
VIDEO AMP 6dB
MUTE V.D.INS H.D.INS W.CLIP D.CLIP
SYNC AMP
P.B Y/C MIX AMP
AMP 6DB
PIC -CONT
DELAY
SYNC SEP
LPF
R
P
MAIN EMPHA
NL EMPHA
DETAIL ENHAN
WHITE DARK CLIP
HPF
LIM
LPF
LPF
MIX
LPF
FM DEMOD
CLAMP
CLAMP
CLAMP
CORR
LIM
LIM
AMP
NL DE-EMPH
NOISE CANCELL
AGC
CCD
PB-Y LEVEL
LPF
CORR OUT
LPF
CCD
N.C ADJ
DEV SET
CAR SET
DOC STOP
PB-H
ALL 5V
IC101 (LA7322)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

Fig. 3-1 REC Mode

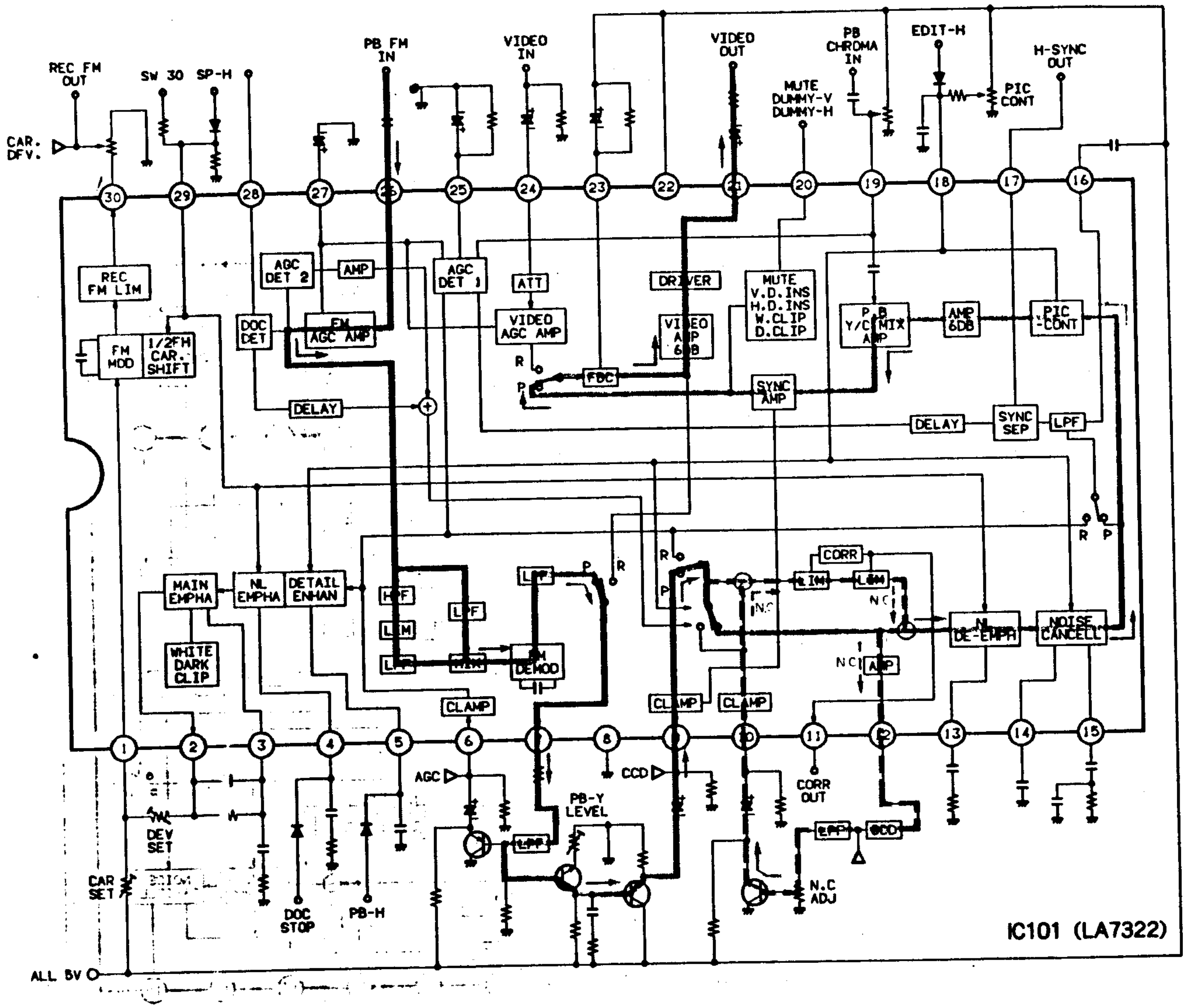

REC FM OUT
SW 30
SP-H
PB FM IN
VIDEO IN
VIDEO OUT
PB CHROMA IN
EDIT-H
H-SYNC OUT
MUTE DUMMY-V DUMMY-H
PIC CONT
CAR. DFV.
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
REC FM LIM
FM MOD
1/2FH CAR. SHIFT
AGC DET 2
AMP
DOC DET
FM AGC AMP
AGC DET 1
ATT
VIDEO AGC AMP
R
P
FBC
DRIVER
VIDEO AMP 6DB
MUTE V.D.INS H.D.INS W.CLIP D.CLIP
SYNC AMP
P.B Y/C MIX AMP
AMP 6DB
PIC CONT
DELAY
DELAY
SYNC SEP
LPF
R
P
MAIN EMPHA
NL EMPHA
DETAIL ENHAN
WHITE DARK CLIP
HPF
LIM
LPF
LPF
MIX
LPF
P
R
FM DEMOD
CLAMP
CORR
LIM
LIM
N.C
NL DE-EMPH
NOISE CANCELL
N.C
AMP
CLAMP
CLAMP
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
AGC
CCD
PB-Y LEVEL
CORR OUT
LPF
CCD
N.C ADJ
DEV SET
CAR SET
DOC STOP
PB-H
ALL 5V
IC101 (LA7322)

Fig. 3-2 PB Mode

**IC101 (LA7322) Terminal Name**

| Pin No. | Terminal Name | Pin No. | Terminal Name |
|---|---|---|---|
| 1 | Y-FM MODULATOR IN | 16 | SYNC SEPARATOR FILTER |
| 2 | PRE EMPHASIS OUT | 17 | H SYNC OUT |
| 3 | MAIN EMPHASIS FEEDBACK | 18 | PICTURE CONTROL |
| 4 | NL EMPHASIS FILTER | 19 | PB CHROMA IN |
| 5 | DETAIL FILTER | 20 | MUTE, DUMMY-V, DUMMY-H |
| 6 | REC CLAMP IN | 21 | VIDEO OUT |
| 7 | REC AGC OUT, PB DEMODULATOR OUT | 22 | Vcc |
| 8 | GND | 23 | FBC FILTER |
| 9 | PB CLAMP IN | 24 | VIDEO IN |
| 10 | YD CLAMP IN | 25 | AGC |
| 11 | CORRELATION DETECT OUT | 26 | PB Y-FM IN |
| 12 | CCD DRIVE | 27 | AGC |
| 13 | NL DE-EMPHASIS FILTER | 28 | DOC DETECT OUT |
| 14 | NOISE CANCEL FILTER-1 | 29 | SP-H, SW30 |
| 15 | NOISE CANCEL FILTER-2 | 30 | REC Y-FM OUT |

**Table 3-1.**

**IC101 (LA7322) Mode Switching Control Table**

| Pin No. | Mode | L | M | H |
|---|---|---|---|---|
| 4 | DOC STOP | DOC ON | – | DOC OFF 3.6V OVER |
| 5 | R/P Mode | REC Mode | – | PB Mode 3.9V OVER |
| 18 | EDIT Mode | EDIT OFF | – | EDIT ON 3.6V OVER |
| 20 | MUTE | NORMAL 1.5V UNDER | Pedestal Mute 1.9 to 3.2V | SYNC TIP Mute 3.6V OVER |
| 29 | TAPE SPEED | EP Mode 1.6V UNDER | – | SP MODE 2.0V OVER |

**Table 3-2.**

## 3-2. CHROMA SIGNAL PROCESSING CIRCUIT

IC121 (TA8632) is a playback/recording for VHS system chroma signals, Processing IC.

This IC contains all of the basic recording/playback functions for the chroma signal processing system, and this single chip performs all chroma signal recording/playback processing for the various TV broadcast systems (NTS, PAL and SECAM).
The internal block diagram of IC121 is shown in Fig. 3-3 as well as the peripheral circuit configuration for chroma signal processing. The terminal specifications of IC121 and IC mode select control tables are shown in Tables 3-3 through 3-4.

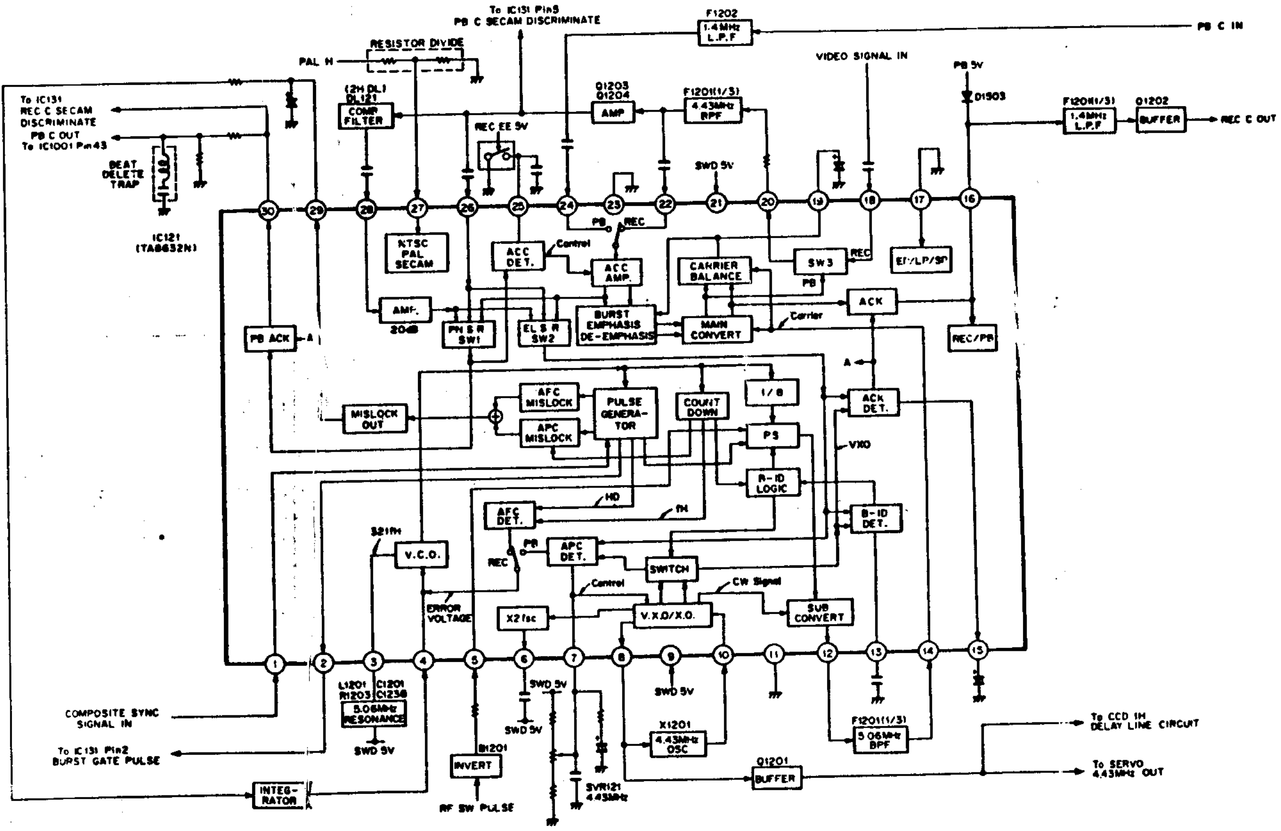

To IC131 Pin5
PB C SECAM DISCRIMINATE
F1202
1.4MHz L.P.F
PB C IN
RESISTOR DIVIDE
PAL H
VIDEO SIGNAL IN
PB 5V
D1503
F1201(1/3)
1.4MHz L.P.F
Q1202
BUFFER
REC C OUT
To IC131
REC C SECAM
DISCRIMINATE
PB C OUT
To IC1001 Pin43
BEAT DELETE TRAP
(2H DL)
DL121
COMB FILTER
Q1203
Q1204
AMP
F1201(1/3)
4.43MHz BPF
REC EE 5V
SWD 5V
IC121
(TA8632N)
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
PB
REC
NTSC PAL SECAM
ACC DET.
Control
ACC AMP.
CARRIER BALANCE
SW3
REC
PB
EP/LP/SP
AMP.
20dB
PN S R SW1
EL S R SW2
BURST EMPHASIS DE-EMPHASIS
MAIN CONVERT
Carrier
ACK
PB ACK
A
REC/PB
A
AFC MISLOCK
APC MISLOCK
MISLOCK OUT
PULSE GENERATOR
COUNT DOWN
1/8
ACK DET.
PS
VXO
R-ID LOGIC
B-ID DET.
HD
fH
AFC DET.
321fH
V.C.O.
PB
REC
APC DET.
SWITCH
Control
CW Signal
ERROR VOLTAGE
X2 fsc
V.X.O/X.O.
SUB CONVERT
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
L1201
R1203
C1201
C1238
5.06MHz RESONANCE
SWD 5V
SWD 5V
SWD 5V
SWD 5V
R1201
INVERT
RF SW PULSE
SVR121
4.43MHz
X1201
4.43MHz OSC
F1201(1/3)
5.06MHz BPF
Q1201
BUFFER
COMPOSITE SYNC SIGNAL IN
To IC131 Pin2
BURST GATE PULSE
INTEGRATOR
To CCD 1H DELAY LINE CIRCUIT
To SERVO 4.43MHz OUT

Fig. 3-3.

[IC121 terminal characteristics]

| Terminal | | Standard DC voltage | Input/output impedance | Standard AC voltage | Remarks | Terminal | | Standard DC voltage | Input/output impedance | Standard AC voltage | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Name | | | | | No. | Name | | | | |
| 1 | Composite sync signal input | —— | 40 kΩ | High 4.7V<br>Low 0V | Sync: positive pulse VCO reference signal | 16 | REC: chrome out<br>PB: select in | 2.4V (ACK: 0V)<br>4.0V or higher: PB mode | 30 Ω | Burst signal 600m Vp-p | Sink current: 1.0 mA |
| 2 | Burst gate pulse output | —— | Open omitter | High 4.3V<br>Low 1.3V | Sync: negative pulse | 17 | EP/LP/SP select input | EP: 5V<br>LP: 2.5V<br>SP: 0V | 50 kΩ or higher (open base) | —— | Controls SW1 burst emphasis |
| 3 | V.C.O. time constant | —— | 10 kΩ | 430 mVp-p | Collector output | 18 | REC video signal input | 2.5V | 20 kΩ | Composite video signal 1Vp-p | Differentiation input |
| 4 | V.C.O. control filter | 2.4V | 10 kΩ when gate; other: current drive | —— | With clamp<br>(HIGH 3.4V)<br>(LOW 1.6V) | 19 | DC feedback filter | 2.9V | Current drive | —— | For ACC amp., main convert, DC balance adj. |
| 5 | Color rotary pulse input | —— | 40 kΩ | High 4.7V<br>Low 0V | CH1: High<br>CH2: Low | 20 | B.P.F. drive output | 2.3V | SEPP | Burst signal 300 mVp-p | REC: Chroma + ΔY<br>PB: 4.21MHz ± 629kHz |
| 6 | X2 Isc output | —— | 4 kΩ | 0.6 Vp-p | Collector output | 21 | Vcc 2 | (5.0V) | —— | —— | ACC, Main convert, Chrome output system |
| 7 | V.X.O. control filter | 2.4V | 10 kΩ when gate; other: current drive | —— | With clamp<br>(HIGH 3.4V)<br>(LOW 1.6V) | 22 | REC chrome signal input | 2.7V | 20 kΩ | Burst signal 150 mVp-p | —— |
| 8 | V.X.O. output | —— | 30 Ω | 1.2 Vp-p | Sink current: 1.0mA | 23 | GND 2 | —— | —— | —— | ACC, Main convert, Chrome output system |
| 9 | Vcc 1 | (5.0V) | —— | —— | For VCO, VXO, sub convert, B-ID, logic | 24 | PB chroma signal input | 2.7V | 20 kΩ | Burst signal 150 mVp-p | —— |
| 10 | V.X.O. input | 3.1V | —— | 0.3 Vp-p | —— | 25 | ACC filter | —— | Current drive | —— | With clamp<br>(HIGH 3.8V)<br>(LOW 2.2V) |
| 11 | GND 1 | —— | —— | —— | For VCO, VXO, sub convert, B-ID, logic | 26 | Chroma signal input 1 | 2.4V | 10 kΩ | Burst signal 300 mVp-p | —— |
| 12 | Sub converter output | 4.4V | 1 kΩ | 1.2Vp-p | Collector output | 27 | NTSC/PAL/SECAM select input | NTSC: 5.0V<br>SECAM: 2.5V<br>PAL: 0V | 50 kΩ or higher (open base) | —— | —— |
| 13 | Burst-ID filter | 3.0V | 5 kΩ | 1.6 Vp-p | —— | 28 | Chroma signal input 2 | 2.7V | 20 kΩ | Burst signal 38 mVp-p | —— |
| 14 | Conversion carrier input | 2.7V | 1 kΩ | 240 mVp-p | —— | 29 | Mislock filter | —— | Current drive | —— | —— |
| 15 | ACK filter | 2.2V | 10 kΩ when gate; other; current drive | —— | HIGH: ACK OFF<br>LOW: ACK ON | 30 | Chroma signal output | 2.7V<br>(PB ACK: 0V) | 30 Ω | Burst signal 300 mVp-p | Sink current: 1.0mA |

**Note:** Characteristics of terminals may vary depending on the Vcc voltage used and other conditions.
The characteristics in the above table are standard values at Vcc = 5V and Tn = 25° C.

Table 3-3.

**[IC121 mode select control table]**

| Mode select Note 2 | | | Mode status | | | |
|---|---|---|---|---|---|---|
| $V_{16}$ | $V_{27}$ | $V_{17}$ | | | | |
| H | H | H | NTSC playback mode<br>• 320 $f_H$ VCO is controlled by APC loop. | SW1 is connected to output side of comb filter (pin-28) | SW2 : connected to output side of comb filter (pin-28) | With burst de-emphasis |
| | | M | | | | No burst de-emphasis |
| | | L | | | SW2 : connected to input side of comb filter (pin-26) | With burst de-emphasis |
| | M | H | SECAM playback mode<br>• APC loop only | SW1 is connected to input side of comb filter (pin-26) | Status of SW2 is not important in SECAM mode | No burst de-emphasis |
| | | M | | | | |
| | | L | | | | |
| | L | H | PAL playback mode<br>• 321 $f_H$ is controlled by APC loop.<br>• The reference signal to B-ID and APC loop is reversed every 1H. | SW1 is connected to output side of comb filter (pin-28) | SW2 : connected to output side of comb filter (pin-28) | |
| | | M | | | | |
| | | L | | | SW2 : connected to input side of comb filter (pin-26) | |
| L (open) Note 1 | H | H | NTSC recording mode<br>• Controlled by AFC, APC loop system | SW1 and SW2 are connected to ACC amplifier side | | With burst emphasis |
| | | M | | | | No burst emphasis |
| | | L | | | | With burst emphasis |
| | M | H | SECAM recording mode<br>• AFC loop only | | | No burst emphasis |
| | | M | | | | |
| | | L | | | | |
| | L | H | PAL recording mode<br>• Controlled by AFC, APC loop system<br>• The reference signal to B-ID and APC loop is reversed every 1H. | | | |
| | | M | | | | |
| | | L | | | | |

Note 1: Also low-range conversion chroma output terminal for recording.

Note 2: $V_{16}$, $V_{27}$, and $V_{17}$ indicate the voltage levels of IC121 pin-16, pin-27, and pin-17 respectively.

Note 3: The voltage levels of $V_{27}$ and $V_{17}$ are as follows:

H level : 5V
M level : 2V
L level : 0V

Note 4: The NTSC mode is not used in this model.

Table 3-4.

## 3-3. SECAM DISCRIMINATION CIRCUIT

The SECAM discrimination circuit is shown in Fig. 3-4. The SECAM discrimination circuit is for areas in which PAL system and pseudo-SECAM (ME-SECAM) system television broadcasts can be received.

For countries which have only PAL system television broadcasts (such as the UK) and countries which have true SECAM (SECAM L) broadcasts (such as France), refer to the circuit diagrams and operational descriptions of models capable of receiving these television broadcasts.

The 3-3. SECAM Discrimination Circuit is omitted from VCR models for areas in which only PAL system television broadcasts are made, and this section is unnecessary.

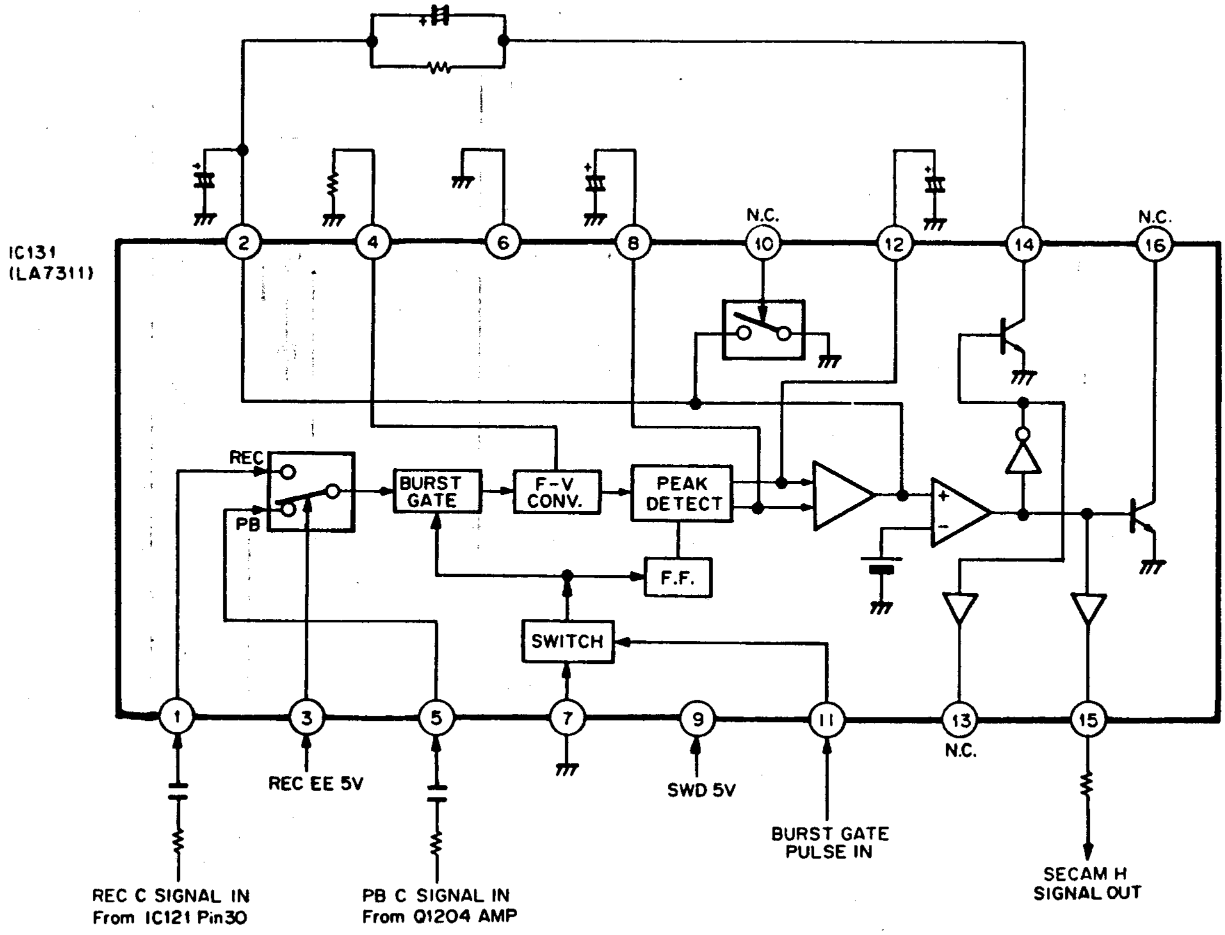

IC131
(LA7311)
N.C.
N.C.
REC
PB
BURST GATE
F-V CONV.
PEAK DETECT
F.F.
SWITCH
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
N.C.
REC EE 5V
SWD 5V
BURST GATE PULSE IN
REC C SIGNAL IN
From IC121 Pin30
PB C SIGNAL IN
From Q1204 AMP
SECAM H SIGNAL OUT

Fig. 3-4.

[Terminal names of IC131]

| Pin No. | Terminal Name | Pin No. | Terminal Name |
|---|---|---|---|
| 1 | REC CHROMA INPUT | 9 | Vcc |
| 2 | SECAM HOLDER | 10 | PAL HIGH IN |
| 3 | REC/PB CONTROL IN | 11 | $\overline{\text{BGP}}$ IN |
| 4 | CURRENT SOURCE | 12 | PEAK FILTER (2) |
| 5 | PB CHROMA INPUT | 13 | PAL HIGH OUT |
| 6 | GND | 14 | PAL DRIVE |
| 7 | BGP IN | 15 | SECAM HIGH OUT |
| 8 | PEAK FILTER (1) | 16 | SECAM DRIVE |

Table 3-5.

The main portion of the SECAM discrimination circuit are used IC (LA7311) in this model. The SECAM discrimination circuit extracts the burst signal (or H-ID signal) from the chroma signal and detects whether there is a difference every 1H (1 horizontal synchronization period). This determines whether the signal is SECAM system (4.25MHz or 4.41MHz) or PAL system (4.43MHz) and outputs a signal to the chroma signal processing IC (TA8632) to select the proper mode for this IC.

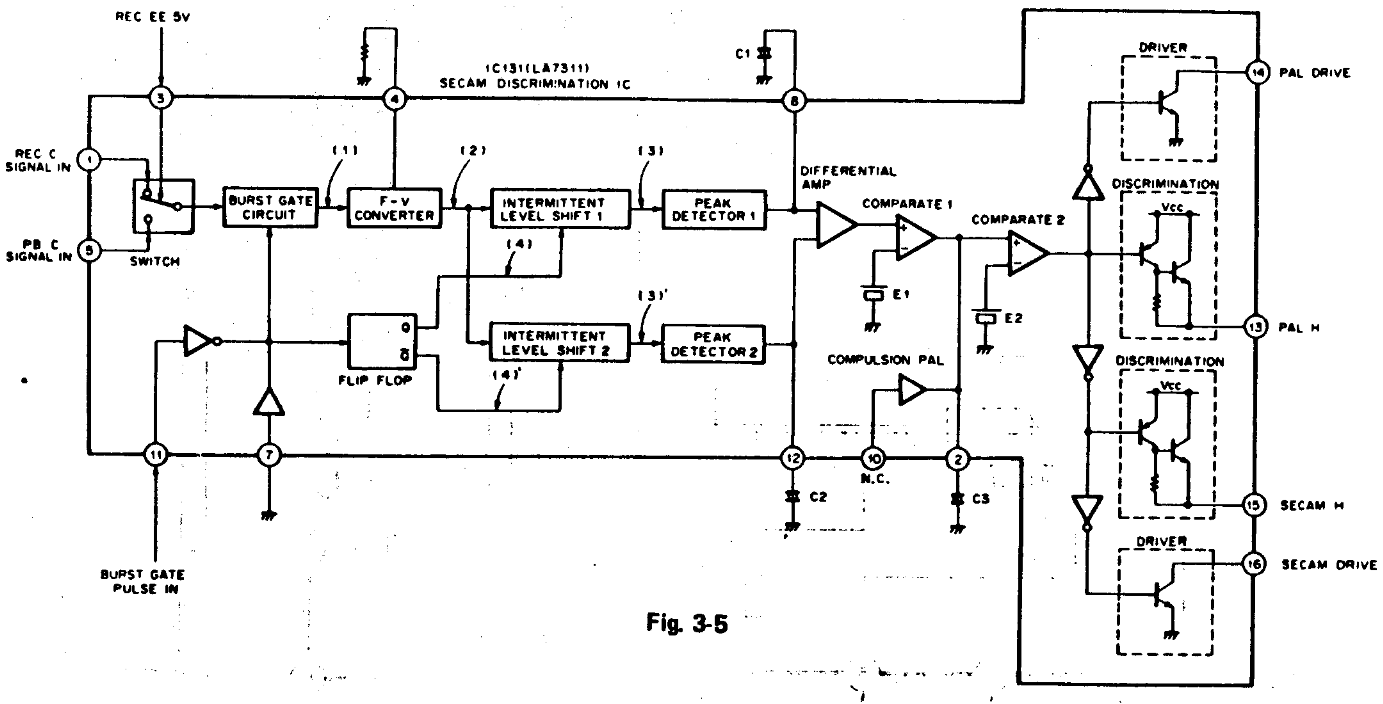

REC EE 5V
IC131(LA7311)
SECAM DISCRIMINATION IC
C1
REC C SIGNAL IN
PB C SIGNAL IN
SWITCH
BURST GATE CIRCUIT
F-V CONVERTER
INTERMITTENT LEVEL SHIFT 1
INTERMITTENT LEVEL SHIFT 2
PEAK DETECTOR 1
PEAK DETECTOR 2
FLIP FLOP
(1)
(2)
(3)
(3)'
(4)
(4)'
DIFFERENTIAL AMP
COMPARATE 1
COMPARATE 2
E1
E2
COMPULSION PAL
N.C.
C2
C3
BURST GATE PULSE IN
DRIVER
DISCRIMINATION
Vcc
DISCRIMINATION
Vcc
DRIVER
PAL DRIVE
PAL H
SECAM H
SECAM DRIVE
1
2
3
4
5
7
8
10
11
12
13
14
15
16

Fig. 3-5

## 4. SERVO CIRCUIT

The rotation servocontrol circuit for the drum and capstan motors is mainly composed of a digital servo IC (LC7417/18), with a built-in control data ROM, and the control-signal amplifier IC (LA7122S). The master servocontrol circuit consists of the speed control circuit and the phase control circuit. The motor servodrive voltage is produced by combining the signals generated by these two circuits. Servocontrol allows for obtaining a stable recording or playback picture.

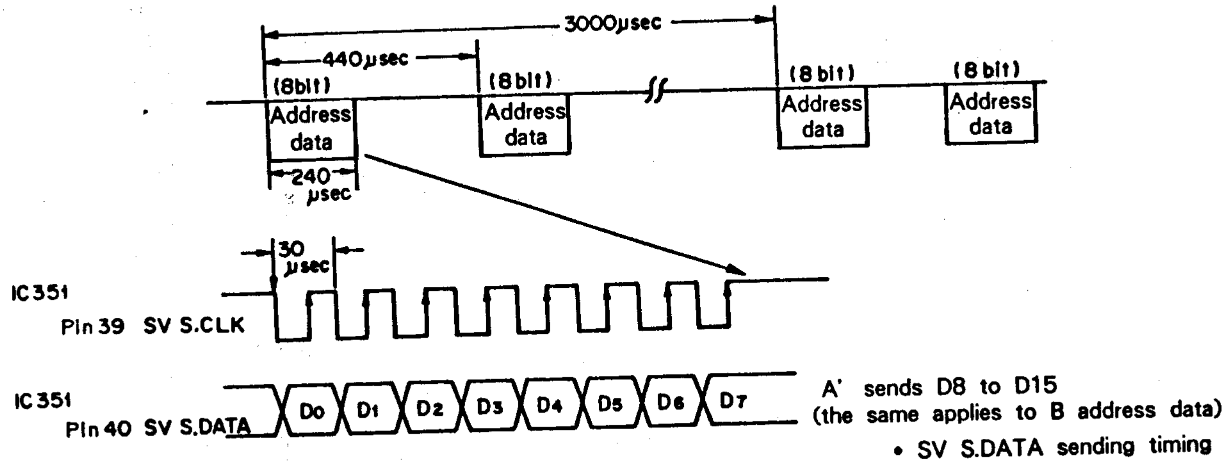
The speed control circuit compares the FG signal frequency, which indicates motor rotation information, with the set frequency data stored in the IC internal ROM, thus obtaining the control error voltage. On the other hand, the phase control circuit compares the phase of the PG/FG signals, which carry motor rotation information, or the playback control signal, with the phase of the reference signal, then calculates the difference between the time difference encountered and the set time-difference data stored in the IC internal ROM, thus obtaining the control error voltage. The speed control circuit and phase control circuit error voltages are combined at the differential amplifier, then supplied to the motor driving circuits as motor servodrive voltage.

### (1) Functions of the Digital Servo IC (IC351, LC7417/18)

- Head drum motor system speed/phase control (built-in ROM)
- Capstan motor system speed/phase control (built-in ROM)
- Generation of reference signal for phase control (built-in ROM)
- Internal mode control by 16-bit serial data
- Automatic tape speed discrimination for playback (EP/LP/SP) (PAL: LP/SP)
- Generation of head switching signal for 4-head /3-head models
- Generation of audio head (AF) switching signal for Hi-Fi models
- Frame advance (intermittent slow) timing control
- Generation of dummy VD during special playback
- Head servo fH compensation during special playback
- Digital tracking delay circuit
- Tracking (X value) compensation circuit
- Recording control signal duty ratio switching for VISS/VASS function
- Playback control signal duty ratio detection for VISS/VASS function
- Compatible with both NTSC and PAL systems

### (2) Servo Circuit Mode Control

The servo circuit operation mode is set by the mode control signal input to this digital servo IC (IC351). This mode control signal is the SV S.DATA signal output as serial data from the system control MPU (IC301). Its form and data contents are shown below.



A' sends D8 to D15
(the same applies to B address data)

- SV S.DATA sending timing

Fig. 4-1.

SV S.DATA are the basic servo circuit control data, including, as shown in the table, the MODE-D0 to D3 data, which set the operation mode, the F/R data, which switches between forward and reverse operation of the capstan motor, the TS-CNT 0 to 2 data, which indicate tape speed, the CAP-ON data, which starts and stops the capstan motor, and the DRUM-ON data, which starts and stops the drum motor.

A feature of this digital servo IC is that tracking delay is also controlled by the TRK-DATA 0 to 6 included in the SV S.DATA. This allows digital tracking control for higher reliability, and also allows to use the auto tracking function by adding an ATR (auto tracking) MPU (IC381) to the system control circuit.

For details on the SV S.DATA signal, refer to the main output signals description in section 2-15. SYSTEM CONTROL MPU (IC301), paragraph (3).

[Contents of SV S.DATA]

| | A Address Data | B Address Data |
|---|---|---|
| D0 | MODE – D0 | TRK – DATA0 |
| D1 | MODE – D1 | TRK – DATA1 |
| D2 | MODE – D2 | TRK – DATA2 |
| D3 | MODE – D3 | TRK – DATA3 |
| D4 | F/R | TRK – DATA4 |
| D5 | TS – CNT0 | TRK – DATA5 |
| D6 | TS – CNT1 | TRK – DATA6 |
| D7 | TS – CNT2 | SLOW/NORM |
| | A' Address Data | B' Address Data |
| D8 | CAP – ON | CTL – DUTY |
| D9 | DRUM – ON | REMARK |
| D10 | ENV – ON | ATR ON |
| D11 | VD – ON | STILL/SLOW |
| D12 | * | * |
| D13 | F – ADV – P | * |
| D14 | * | * |
| D15 | Address identification "1" | Address identification "0" |

* : Not used

Table 4-1.

### (3) Layout of Digital Servo IC (IC351) and Servo Amplifier IC (IC352) Peripheral Circuits

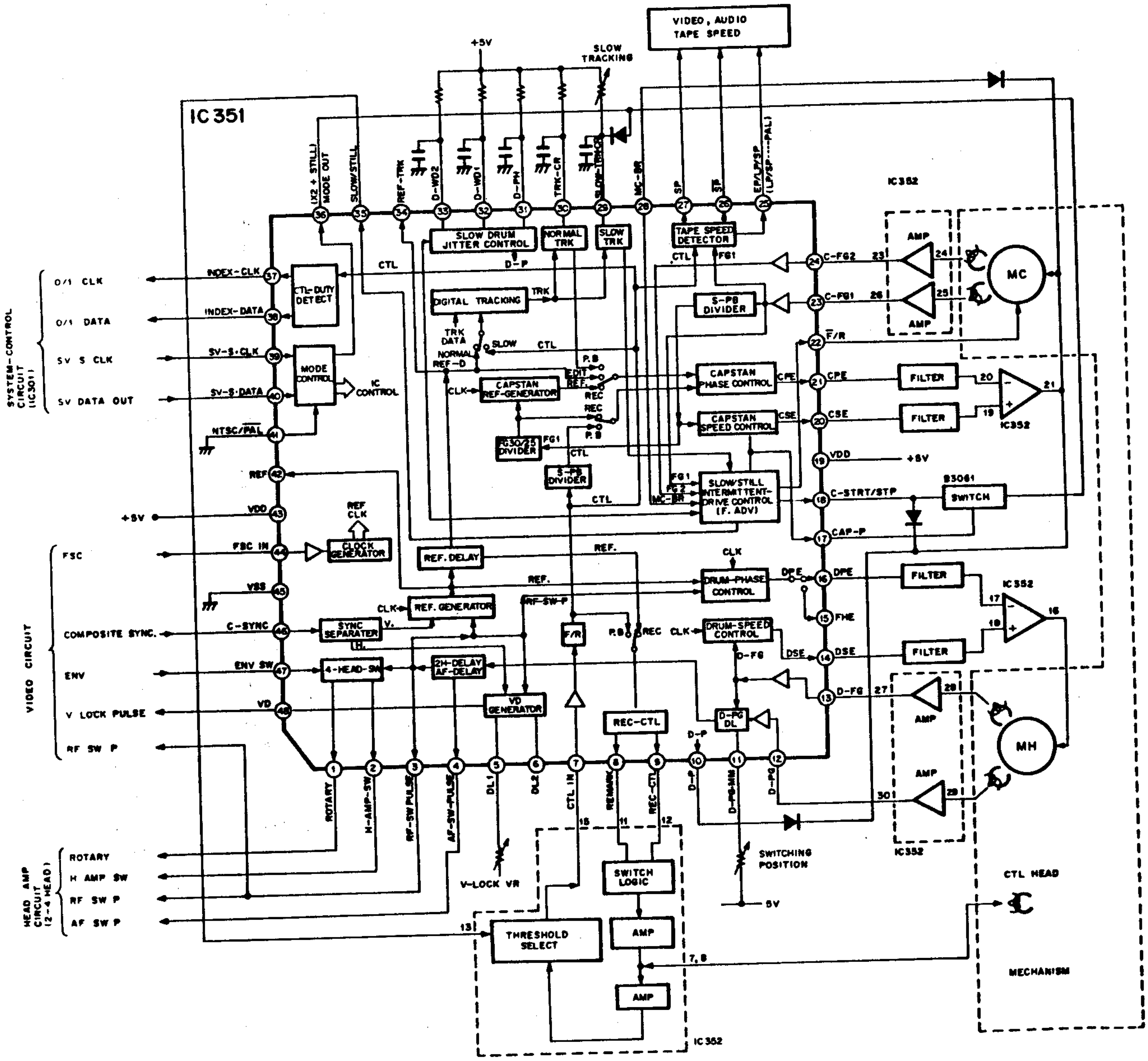

IC351
IC352
+5V
SLOW TRACKING
VIDEO, AUDIO TAPE SPEED
(X2 + STILL) MODE OUT
SLOW/STILL
REF-TRK
D-WD2
D-WD1
D-PH
TRK-CR
SLOW-TRK
MC-BR
SP
SP
EP/LP/SP (LP/SP----PAL)
SLOW DRUM JITTER CONTROL
NORMAL TRK
SLOW TRK
TAPE SPEED DETECTOR
D-P
CTL
FG1
C-FG2
C-FG1
AMP
MC
S-PB DIVIDER
F/R
INDEX-CLK
INDEX-DATA
SV-S-CLK
SV-S-DATA
NTSC/PAL
CTL-DUTY DETECT
MODE CONTROL
IC CONTROL
DIGITAL TRACKING
TRK
TRK DATA
SLOW
NORMAL
REF-D
P.B
EDIT
REF.
REC
CAPSTAN REF-GENERATOR
CLK
CAPSTAN PHASE CONTROL
CPE
CAPSTAN SPEED CONTROL
CSE
FILTER
FG30/25 DIVIDER
S-PB DIVIDER
FG2
SLOW/STILL INTERMITTENT-DRIVE CONTROL (F. ADV)
VDD
+5V
C-STRT/STP
B3061
SWITCH
CAP-P
REF
REF CLK
CLOCK GENERATOR
REF. DELAY
DRUM-PHASE CONTROL
DPE
FHE
REF. GENERATOR
RF-SW-P
SYNC SEPARATER
V.
LH.
F/R
DRUM-SPEED CONTROL
DSE
D-FG
4-HEAD-SW
2H-DELAY AF-DELAY
VD GENERATOR
REC-CTL
D-PG DL
MH
SYSTEM-CONTROL CIRCUIT (IC3011)
0/1 CLK
0/1 DATA
SV S CLK
SV DATA OUT
FSC
FSC IN
VSS
COMPOSITE SYNC.
C-SYNC
ENV
ENV SW
V LOCK PULSE
VD
RF SW P
VIDEO CIRCUIT
ROTARY
H-AMP-SW
RF-SW PULSE
AF-SW-PULSE
DL1
DL2
CTL IN
REMAIN
REC-CTL
D-P
D-PG-MIN
D-PG
HEAD AMP CIRCUIT (2-4 HEAD)
ROTARY
H AMP SW
RF SW P
AF SW P
V-LOCK VR
SWITCH LOGIC
AMP
THRESHOLD SELECT
SWITCHING POSITION
5V
CTL HEAD
MECHANISM
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
7, 8

Fig. 4-2.

### (4) Table of Digital Servo IC (IC351, LC7417/18) Pin Functions

| Pin No. | Name | Input/Output Signal | I/O | Input/Output Function |
|---|---|---|---|---|
| 1 | ROTARY | ROTARY | O | Outputs the head switching control signal for 4-head and 3-head models. |
| 2 | HA-SW | H-AMP-SW | O | |
| 3 | RF-SW | RF-SW-PULSE | O | Video head switching pulse output. |
| 4 | AF-SW | AF-SW-PULSE | O | Audio head (FM) switching pulse output. |
| 5 | DL1 | DL1 | I | Dummy $V_D$ insertion position control CR. |
| 6 | DL2 | DL2 | I | Dummy $V_D$ insertion position control terminal. |
| 7 | CTL | CTL-IN | I | Control signal input. |
| 8 | REMARK | REMAK | O | Outputs the control signal re-recording control signal. Three-value output (H, M, L). |
| 9 | REC-CTL | REC-CTL | O | Recording control signal output. Three-value output (H, OPEN, L). |
| 10 | DRUM-P | D-P | O | Outputs the drum compensation pulse in the slow mode. |
| 11 | DPG-MM | D-PG. MM | I | CR for drum PG signal delay. |
| 12 | DPG | D-PG | I | Drum PG signal input. |
| 13 | DFG | D-FG | I | Drum FG signal input. |
| 14 | DSE | DSE | O | Outputs the speed error for drum system speed control. An output making the drum motor stop is delivered when DRUM-ON is "0".<br>The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation). |
| 15 | FHE | FHE | O | Outputs the horizontal sync signal of the composite sync signal after F-V conversion (using the drum phase control system).<br>The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation). |
| 16 | DPE | DPE | | Error output for drum system phase control.<br>The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation). |
| 17 | CAP-P | C-P | O | Outputs the capstan compensation pulse in the slow mode. |
| 18 | C-START/STP | C-START/STP | O | Outputs the capstan motor start and brake pulses in the slow mode. |
| 19 | $V_{DD}$ | | | +5V ± 10% |
| 20 | CSE | CSE | O | Capstan system speed error output. An output making the capstan motor stop is delivered when CAP-ON is "0".<br>The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation). |
| 21 | CPE | CPE | O | Capstan system phase reciprocal error output.<br>The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation). |
| 22 | F/R-OUT | F/R | O | Capstan motor forward/reverse control output. "1" sets the reverse mode, and "0" the forward mode. |
| 23 | CFG1 | C-FG1 | I | Capstan FG signal input. |
| 24 | CFG2 | C-FG2 | I | 2nd capstan FG signal input. Used for stop detection in the intermittent slow mode. |
| 25 | EP/LP/SP | EP/LP/SP | O | Recording mode output. Three-value output ("H" is for EP mode, "M" for LP mode and "L" for SP mode). |
| 26 | $\overline{\text{SP-OUT}}$ | $\overline{\text{SP}}$ | O | Recording mode output. "L" is for SP mode. |
| 27 | SP-OUT | SP | O | Recording mode output. "H" is for SP mode. |
| 28 | CAP-BRK | MC-BR | I | Control input for capstan F/R output. |
| 29 | SLOW-CR | SLOW-TRK-CR | I | CR for slow tracking adjustment. |
| 30 | TRK-CR | TRK-CR | I | CR for tracking adjustment. |
| 31 | D-PH | D-PH | I | CR for drum compensation timing adjustment in the slow mode. |
| 32 | D-WD1 | D-WD1 | I | |
| 33 | D-WD2 | D-WD2 | I | |
| 34 | REF-TRK | REF-TRK | O | Outputs the tracking delay input signal. |
| 35 | SLW/STL | SLOW/STILL | O | Internal mode signal output. "H" in the slow mode. |
| 36 | MODE-OUT | MODE (×2+STILL) | O | Mode decoding signal output. At the ×2 SPEED mode and starting time of SLOW/STILL mode, output "H" level. |
| 37 | INDX-CK | INDEX-CLK | O | Outputs the timing for the control signal duty detector. |
| 38 | INDX-DT | INDEX-DATA | O | Outputs the control signal duty detection results. |
| 39 | SCLK | SV-S · CLK | I | Serial transmission clock pulse input. |
| 40 | SDATA | SV-S · DATA | I | Serial data input terminal. |
| 41 | NTSC/PAL | NTSC/$\overline{\text{PAL}}$ | I | NTSC/PAL switching input. "H" is for NTSC, "L" for PAL. |
| 42 | REF-OUT | REF | O | Outputs the internal reference signal. |
| 43 | $V_{DD}$ | | | +5V supply terminal |
| 44 | $F_{SC}$ | FSC IN | I | Input for the IC internal system clock pulse. A level of at least 0.3 Vp-p is required.<br>The color subcarrier signal is input by capacitive coupling. |
| 45 | $V_{SS}$ | | | Ground |
| 46 | C-SYNC | C-SYNC | I | Composite sync signal input. |
| 47 | ENV | ENV SW | I | Head selection signal (PB envelope detection signal) input for 4-head special playback. |
| 48 | VD OUT | VD | O | Dummy $V_D$ signal output. Three-value output (H, M, L). |

Table 4-2.

SANYO

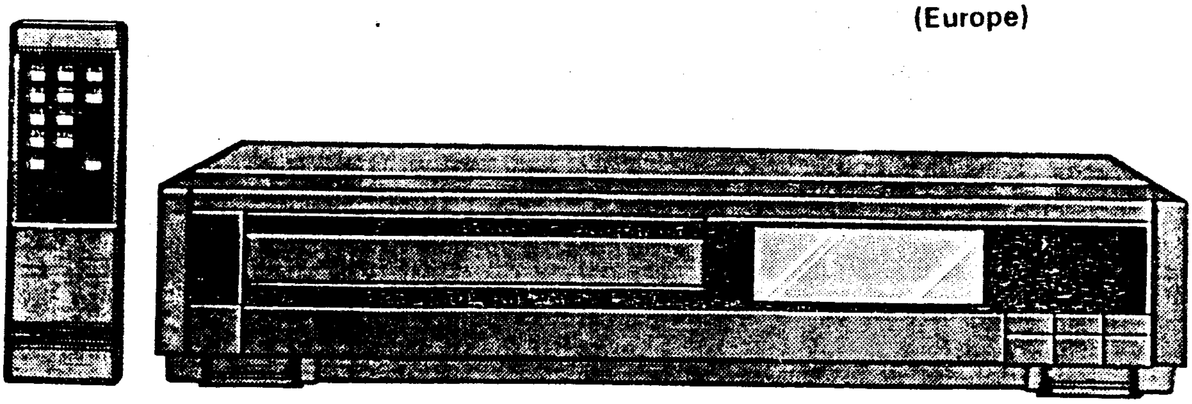
# Parts List & Circuit Diagrams

## Colour Video Cassette Recorder

## VHR-4100G
(West Germany)

## VHR-4100EX
(Europe)

## VHR-4100EV
(Europe)



VHS HQ
PAL

### Contents

Accessories . . . . . . . . . . . . . . . . . . . . 1
Packing Materials . . . . . . . . . . . . . . . 1
Cabinet & Chassis Parts . . . . . . . . . . . 1
Mechanism Parts 1 . . . . . . . . . . . . . . 2
Mechanism Parts 2 . . . . . . . . . . . . . . 3
Mechanism Parts 3 . . . . . . . . . . . . . . 5

Electrical Parts
COMPL, CP-A . . . . . . . . . . . . . . . . . 6
COMPL, VD-1 . . . . . . . . . . . . . . . . . 9
COMPL, VD-2 . . . . . . . . . . . . . . . . 11
COMPL, VP-1 . . . . . . . . . . . . . . . . 11
COMPL, AD-1 . . . . . . . . . . . . . . . . 12
COMPL, SY-4 . . . . . . . . . . . . . . . . 13
COMPL, PW-1 . . . . . . . . . . . . . . . . 13
COMPL, PW-2 . . . . . . . . . . . . . . . . 13
COMPL, TM-1 . . . . . . . . . . . . . . . . 13
COMPL, TM-3 . . . . . . . . . . . . . . . . 14
COMPL, TB-1 . . . . . . . . . . . . . . . . 15
Remote Control Unit Circuit Diagram . . . . . . . . . . . . 16

Please see other materials with Reference No. given in table below.

| Materials | Model No. | Reference No. |
|---|---|---|
| Service Manual | VHR-4100 Series | WM-22341 |
| Mechanism Manual | VHR-4100 Series | WM-22534 |
| Training Manual | VHR-4100 Series | WM-22342 |

### PRODUCT SAFETY NOTICE

The components designated by a symbol (⚠) in this schematic diagram designates components whose value are of special significance to product safety. Should any component designated by a symbol need to be replaced, use only the part designated in the Parts List. Do not deviate from the resistance, wattage and voltage ratings shown.

NOTE: Parts order must contain Model Number, Part Number and Description.

VHR-4100G, EX, EV
143-112-00, -01, -56

REFERENCE No. WM-22340

## ACCESSORIES

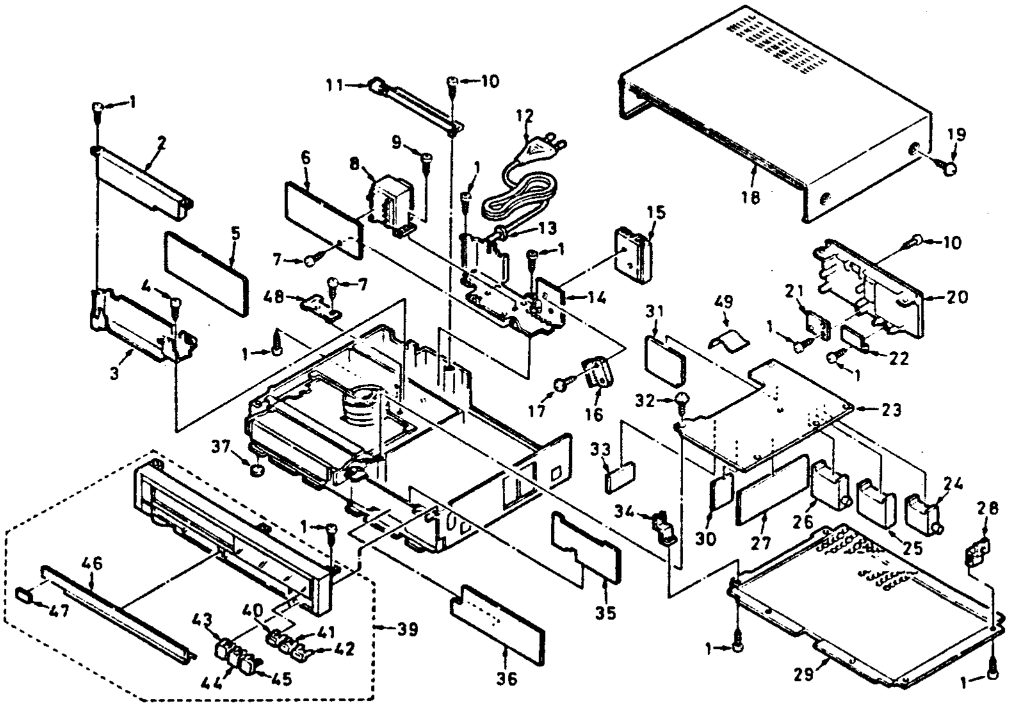
| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| | 613 079 2907 | INSTRUCTION MANUAL(VHR-4100G ONLY) |
| OR | 613 022 4620 | INSTRUCTION MANUAL(WITHOUT VHR-4100G) |
| | 613 011 7359 | CORD |
| | 613 082 1959 | PROTECTOR SHEET |
| | 613 077 4385 | REMOCON |

## PACKING MATERIALS

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| | 613 079 2679 | INNER CORR CASE(VHR-4100G) |
| OR | 613 022 4576 | INNER CORR CASE(VHR-4100EX) |
| OR | 613 079 2730 | INNER CORR CASE(VHR-4100EV) |
| | 613 022 4606 | CUSHION INNER.LEFT |
| | 613 022 4613 | CUSHION INNER.RIGHT |
| | 613 061 7279 | IND POLYE COVER |

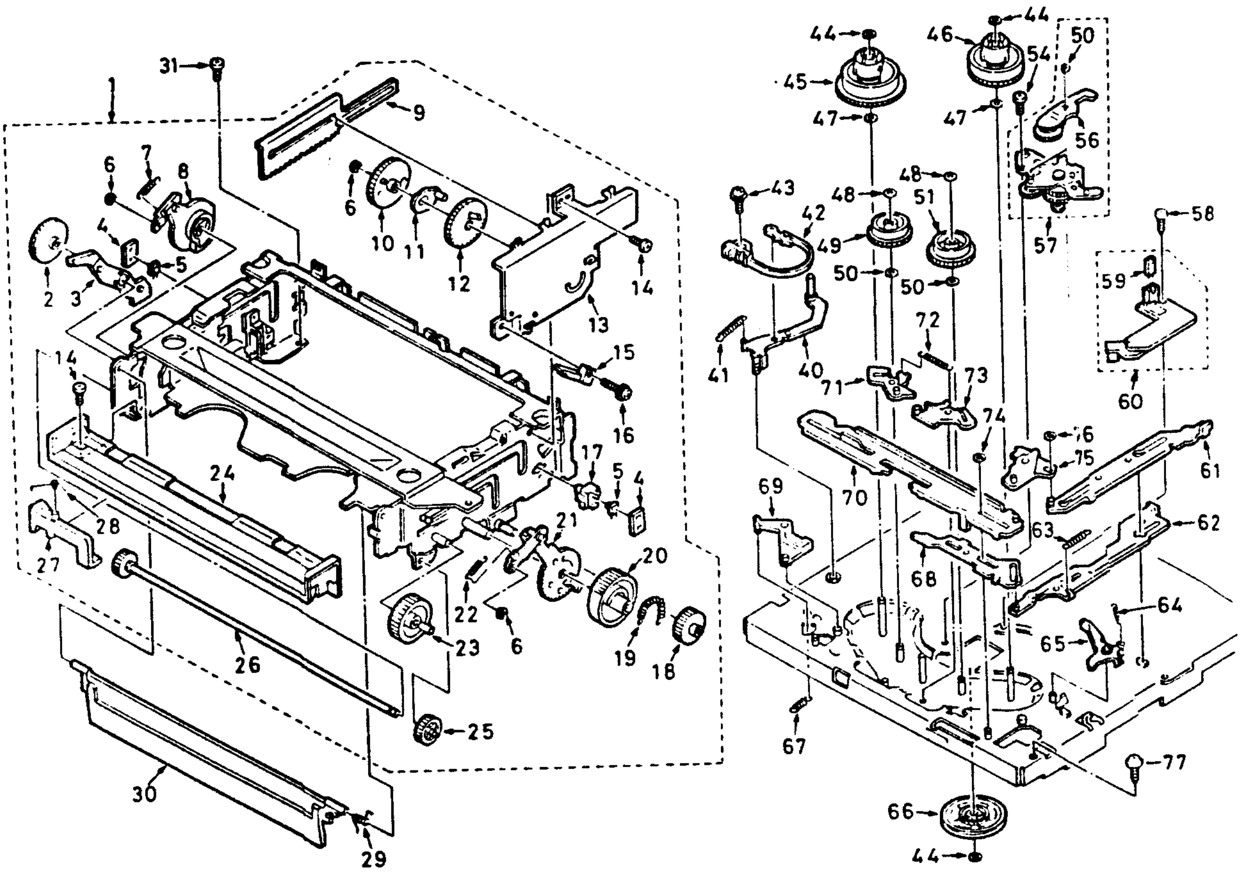
## CABINET & CHASSIS PARTS

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| 1 | 411 021 4005 | SCR S-TPG BIN 3X12 |
| 2 | 613 077 1735 | COMPL.VP-1 |
| 3 | 613 077 3128 | BRACKET.PRIAMP |
| 4 | 411 001 8504 | SCR BIN 3X4 |
| 5 | 613 079 0859 | SHIELD |
| 6 | 613 080 3672 | COMPL.PW-1(WITHOUT VHR-4100G). WITHOUT LO.NO.14&15 |
| OR | 613 077 1803 | COMPL.PW-1(VHR-4100G ONLY).WITHOUT LO.NO.14&15 |
| 7 | 411 021 6405 | SCR S-TPG BIN 3X8 |
| 8 ⚠ | 613 077 4286 | POWER TRANS.T5001 |
| 9 | 411 021 9604 | SCR S-TPG BIN 4X8 |
| 10 | 411 021 4104 | SCR S-TPG BIN 3X12 |
| 11 | 613 077 3487 | BLIND |
| 12 ⚠ | 613 033 4954 | PLUG ASSY |
| 13 | 613 053 6686 | FIXER |
| OR | 613 053 8017 | FIXER |
| 14 | 613 077 3142 | BRACKET |
| 15 | 613 079 3973 | HEAT SINK |
| 16 | 613 078 6579 | COMPL.PW-2 |
| 17 | 411 021 4500 | SCR S-TPG BIN 3X16 |
| 18 | 613 022 0554 | COVER.TOP |
| 19 | 412 024 7604 | SPECIAL SCREW |
| 20 | 613 077 2619 | TERMINAL |
| 21 | 613 080 3610 | COMPL.TB-1 |
| 22 | 613 077 3159 | BRACKET |
| 23 | 613 079 3447 | COMPL.CP-A(WITHOUT VHR-4100G) |
| OR | 613 079 3379 | COMPL.CP-A(VHR-4100G ONLY) |
| 24 | 613 080 5836 | MODULATOR.RF |
| OR | 613 080 5843 | MODULATOR.RF |
| 25 | 613 031 8398 | ASSY.TN-1 |
| 26 | 613 000 1504 | ASSY.TUNER |
| 27 | 613 077 1810 | COMPL.VD-1 |
| 28 | 613 048 6912 | BRACKET |
| 29 | 613 022 0578 | COVER.BOTTOM |
| 30 | 613 078 6197 | COMPL.VD-2 |
| 31 | 613 079 7421 | COMPL.AD-1(VHR-4100G ONLY) |
| OR | 613 079 7438 | COMPL.AD-1(WITHOUT VHR-4100G) |
| 32 | 411 021 4203 | SCR S-TPG BIN 3X12 |
| 33 | 613 080 9124 | COMPL.SY-4 |
| 34 | 613 022 0738 | BRACKET.CABINET |
| 35 | 613 080 9575 | COMPL.TM-3(VHR-4100EX ONLY) |
| OR | 613 077 1599 | COMPL.TM-3(WITHOUT VHR-4100EX) |
| 36 | 613 080 9568 | COMPL.TM-1 |
| 37 | 613 047 1772 | STAND |
| 39 | 613 077 2077 | ASSY.CABINET.FRONT(VHR-4100G) |
| OR | 613 021 9541 | ASSY.CABINET.FRONT(VHR-4100EX) |
| OR | 613 078 7507 | ASSY.CABINET.FRONT(VHR-4100EV) |
| 40 | 613 022 0622 | HINGE BUTTON.EJECT |
| 41 | 613 022 0639 | HINGE BUTTON.REW |
| 42 | 613 022 0646 | HINGE BUTTON.FF |
| 43 | 613 022 0653 | HINGE BUTTON.REC |
| 44 | 613 022 0660 | HINGE BUTTON.PLAY |
| 45 | 613 022 0677 | HINGE BUTTON.STOP |
| 46 | 613 077 2534 | DOOR(VHR-4100G) |
| OR | 613 022 0592 | DOOR(VHR-4100EX) |
| OR | 613 078 9747 | DOOR(VHR-4100EV) |
| 47 | 613 042 0183 | BADGE |
| 48 | 613 081 2315 | BRACKET.SP GUIDE |
| 49 | 613 077 4422 | FREXIBLE FRAT CABLE.MC-2~CP-1 |



## MACHANISM PARTS 1

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| 1 | 613 022 0523 | COMPL.CASSETTE MECHA |
| 2 | 613 022 2572 | GEAR.IDLER L |
| 3 | 613 022 2275 | LEVER.DOOR OPENER |
| 4 | 613 022 0585 | LID |
| 5 | 407 098 3201 | PHOTO COUPLE PN150SAN |
| 6 | 411 015 9801 | RING E 2.3 |
| 7 | 613 022 1643 | SPRING.LINK L |
| 8 | 613 022 0073 | ASSY.GEAR.LEVER L |
| 9 | 613 022 2695 | RACK |
| 10 | 613 022 2633 | GEAR.LOCK |
| 11 | 613 021 9916 | ASSY.LEVER.PINION |
| 12 | 613 022 2626 | GEAR.PINION |
| 13 | 613 021 9657 | ASSY.BRACKET.GEAR |
| 14 | 411 027 1305 | SCR S-TPG BIN 2.6X4 |
| 15 | 613 006 4479 | SPECIAL SWITCH |
| 16 | 411 106 9208 | SCR PAN+SW+W 2X9 |
| 17 | 613 022 0936 | HOLDER.TRANSISTOR |
| 18 | 613 022 2619 | GEAR.IDLER |
| 19 | 613 022 1667 | SPRING.GEAR MAIN |
| 20 | 613 022 2596 | GEAR.MAIN |
| 21 | 613 022 0097 | ASSY.GEAR.LEVER R |
| 22 | 613 022 1674 | SPRING.LINK R |
| 23 | 613 022 2602 | GEAR.IDLER R |
| 24 | 613 022 4064 | BOARD.UNDER |
| 25 | 613 022 2558 | GEAR.COUPLE R |
| 26 | 613 022 0226 | ASSY.ROD |
| 27 | 613 022 2237 | LEVER.SAFETY SW |
| 28 | 613 022 1827 | SPRING.SAFETY SW |
| 29 | 613 022 1803 | SPRING.DOOR |
| 30 | 613 022 4101 | CASSETTE DOOR |
| 31 | 411 001 8702 | SCR BIN 3X6 |
| 40 | 613 021 9831 | ASSY.LEVER.TENSION |
| 41 | 613 022 1537 | SPRING.LEVER TENSION |
| 42 | 613 021 9701 | ASSY.HOLDER.BAND |
| 43 | 411 036 2805 | SCR PAN+SW+W 2.6X6 |
| 44 | 411 109 1605 | WASHER Y 2.6X6X0.25 |
| 45 | 613 022 0127 | ASSY.REEL.SUPPLY |
| 46 | 613 022 0110 | ASSY.REEL.TAKE UP |
| 47 | 412 021 5306 | SPECIAL WASHER 3.1X6X0.3T |
| OR | 412 015 8900 | SPECIAL WASHER 3.1X6X0.4T |
| OR | 412 015 8504 | SPECIAL WASHER 3.1X6X0.5T |
| 48 | 411 109 1506 | WASHER Y 2.1X6X0.25 |
| 49 | 613 022 2473 | GEAR.REEL SUPPLY |
| 50 | 412 026 7305 | SPECIAL WASHER 2.6X6X0.25 |
| 51 | 613 022 2480 | GEAR.REEL TAKE UP |
| 54 | 411 031 0905 | SCR BIN 2.6X4 |
| 56 | 613 022 0134 | ASSY.IDLER |
| 57 | 613 022 0141 | COMPL.IDLER.CLUTCH |
| 58 | 411 076 5804 | SCR TPG BIN 2.6X8 |
| 59 | 407 016 7205 | LED LN59 |
| 60 | 613 078 6302 | COMPL.MC-4 |
| 61 | 613 021 9985 | ASSY.SLIDE.ACT PLATE |
| 62 | 613 021 9992 | ASSY.SLIDE.C BRAKE |
| 63 | 613 022 1612 | SPRING.RETURN SLIDE |
| 64 | 613 022 1506 | SPRING.SUB T |
| 65 | 613 022 0196 | ASSY.BRAKE.SUB T |
| 66 | 613 077 3647 | PULLEY.REEL |
| 67 | 613 022 1490 | SPRING.SUB SUPPLY |
| 68 | 613 022 2374 | SLIDE.ACT BRAKE |
| 69 | 613 022 2886 | BRAKE.SUB SUPPLY |
| 70 | 613 022 0004 | ASSY.SLIDE.M PLATE |
| 71 | 613 080 9216 | ASSY.BRAKE.SUPPLY |
| 72 | 613 022 1544 | SPRING.MAIN BRAKE |
| 73 | 613 080 9209 | ASSY.BRAKE.TAKE UP |
| 74 | 411 109 3005 | WASHER Y 2.6X5X0.5 |
| 75 | 613 022 2015 | LEVER.CONT PLATE |
| 76 | 411 109 1407 | WASHER Y 2.1X5X0.25 |
| 77 | 411 021 7907 | SCR S-TPG BIN 4X12 |

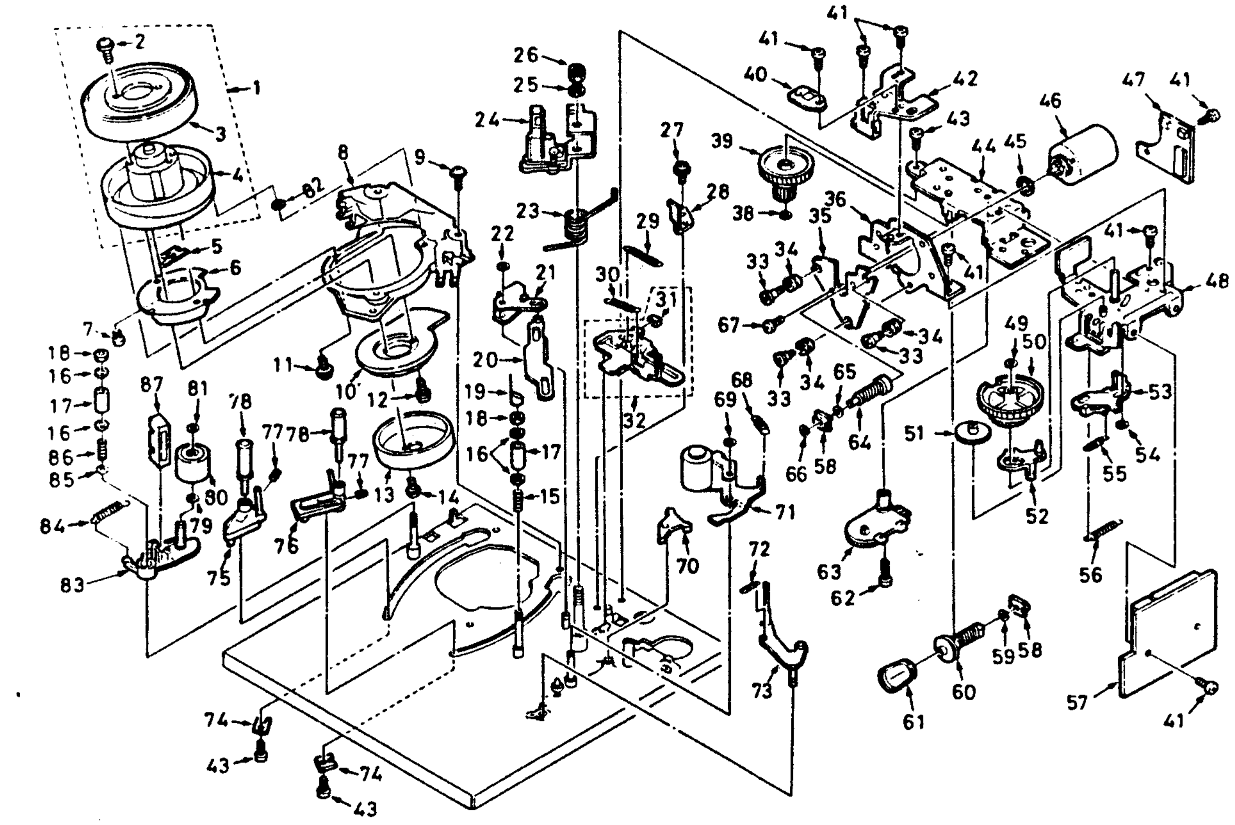


## MACHANISM PARTS 2

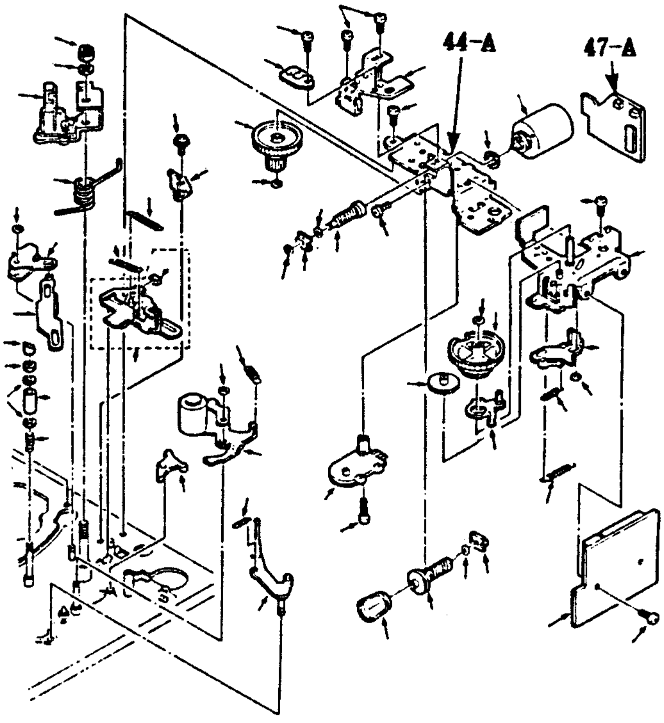
| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| 1 | 613 022 0257 | COMPL.CYLINDER.2N2P |
| OR | 613 080 1647 | COMPL.CYLINDER.2N2P |
| 2 | 411 038 1608 | SCR PAN+W 3X8 |
| 3 | 613 022 0264 | ASSY.CYLINDER.UPR 2N2P |
| OR | 613 080 1654 | ASSY.CYLINDER.UPR 2N2P |
| 4 | 613 022 0271 | ASSY.CYLINDER.LWR2 |
| OR | 613 080 1661 | ASSY.CYLINDER.LWR 2 |
| 5 | 613 081 4036 | SPACER.MOTOR |
| 6 | 613 079 0712 | BRACKET.MOTOR CYL |
| 7 | 412 026 8302 | SPECIAL SCREW M2.3X3 |
| 8 | 613 022 1001 | BASE.CYLINDER |
| 9 | 411 047 7509 | SCR PAN+FLG 3X6 |
| 10 | 613 022 4026 | STATOR.MOTOR CYL |
| 11 | 411 047 5000 | SCR PAN+FLG 2.6X8 |
| 12 | 411 044 9209 | SCR PAN+SW 2.3X8 |
| 13 | 613 022 4019 | ROTOR.MOTOR CYL |
| 14 | 411 044 9001 | SCR PAN+SW 2.3X6 |
| 15 | 613 022 1766 | SPRING.ADJUST GUIDE |
| 16 | 613 053 3227 | SPECIAL WASHER |
| 17 | 613 058 3307 | TAPE GUIDE |
| 18 | 412 026 2607 | SPECIAL NUT |
| 19 | 613 081 7501 | ASSY.CAP |
| 20 | 613 021 9961 | ASSY.SLIDE.ACT PINCH |
| 21 | 613 021 9800 | ASSY.LEVER.CAM PINCH |
| 22 | 411 109 2008 | WASHER Y 3.1X8X0.5 |
| 23 | 613 022 1797 | SPRING.ACE HEAD |
| 24 | 613 021 9640 | COMPL.BRACKET.HEAD |
| 25 | 613 051 4615 | SPACER |
| 26 | 412 015 8207 | SPECIAL NUT |
| 27 | 411 120 0007 | SCR PAN+SW+W 2.6X5 |
| 28 | 613 022 0752 | BRACKET.STOPPER |
| 29 | 613 022 1575 | SPRING.LINK LOCK |
| 30 | 613 022 1582 | SPRING.SLIDE BRAKE |
| 31 | 613 022 2725 | DAMPER |
| 32 | 613 022 0059 | ASSY.SLIDE.CAM |
| 33 | 412 021 1407 | SPECIAL SCREW |
| 34 | 613 079 1030 | DAMPER.MOTOR |
| 35 | 613 079 0989 | PLATE.MOTOR |
| 36 | 613 079 0736 | BRACKET.STAND |
| 38 | 411 109 1902 | WASHER Y 3.1X6X0.5 |
| 39 | 613 077 3579 | GEAR.HELICAL |
| 40 | 613 021 9534 | ASSY.DEW SENSOR |
| 41 | 411 040 2303 | SCR PAN 2.6X5 |
| 42 | 613 077 3180 | BRACKET.HOLDER |
| 43 | 411 031 1209 | SCR BIN 2.6X5 |
| 44 | 613 079 6868 | ASSY.BRACKET.MOTOR |
| 44-A | 613 078 7682 | ASSY.BRACKET.MOTOR |
| 45 | 613 077 3616 | DAMPER.WORM |
| 46 | 613 021 9527 | ASSY.LOADING MOTOR |
| 47 | 613 078 6623 | COMPL.MC-3 |
| 47-A | 613 078 6517 | COMPL.MC-3 |
| 48 | 613 078 7705 | ASSY.BRACKET.FRONT |
| 49 | 613 027 0504 | WASHER 4.1X6.5X0.5 |
| 50 | 613 077 3586 | GEAR.HELICAL FRONT |
| 51 | 613 022 2534 | GEAR.FRONT LOAD |
| 52 | 613 021 9824 | ASSY.LEVER.FRONT |
| 53 | 613 022 0011 | ASSY.SLIDE.FRONT |
| 54 | 411 109 3005 | WASHER Y 2.6X5X0.5 |
| 55 | 613 022 1636 | SPRING.LEVER ACT |
| 56 | 613 022 1629 | SPRING.LEVER LOAD |
| 57 | 613 078 6494 | COMPL.MC-2 |
| 57-1 | 403 001 3108 | CERAMIC 0.1U Z 16V.INCLUDE MC-2 |
| 57-2 | 613 009 8309 | SOCKET 26P.INCLUDE MC-2 |
| 58 | 613 077 3227 | HOLDER.WORM |
| 59 | 613 027 0627 | WASHER 2.1X6X0.5 |
| 60 | 613 078 8344 | ASSY.WORM.LOAD |
| 61 | 613 022 2985 | BELT.LOADING |
| 62 | 411 002 5700 | SCR PAN 2.6X12 |
| 63 | 613 077 4361 | ROTARY SWITCH |
| 64 | 613 078 8320 | ASSY.WORM.FRONT |
| 65 | 613 027 0375 | WASHER 2.1X4.0X0.13 |
| 66 | 613 053 2381 | SPECIAL WASHER |
| 67 | 411 040 0507 | SCR PAN 2.6X3 |
| 68 | 613 022 1483 | SPRING.PINCH ROLLER |
| 69 | 411 109 2107 | WASHER Y 3.6X6X0.5 |
| 70 | 613 078 8160 | COMPL.LEVER.ACT BRAKE |
| 71 | 613 022 0158 | COMPL.PINCH ROLLER |
| 72 | 613 022 1568 | SPRING.REVIEW LEVER |
| 73 | 613 021 9886 | ASSY.LEVER.REV GUIDE |
| 74 | 613 022 1919 | PLATE.GUIDE |
| 75 | 613 021 9725 | ASSY.BASE.ROLLER S |
| 76 | 613 021 9732 | ASSY.BASE.ROLLER T |
| 77 | 411 063 0904 | SCR SET HEX-SCT 2X3 |
| 78 | 613 022 0233 | ASSY.GUIDE.ROLLER |
| 79 | 412 026 7800 | SPECIAL WASHER 0.25T |
| 80 | 613 080 6703 | IMPEDANCE ROLLER |
| 81 | 411 109 2602 | WASHER Y 1.5X4X0.25 |
| 82 | 412 029 8606 | WASHER 3.2X5.5X0.2 |
| 83 | 613 021 9893 | ASSY.LEVER.FE HEAD |
| 84 | 613 022 1698 | SPRING.ERASE HEAD |
| 85 | 411 109 1704 | WASHER Y 6.4X10X0.25 |
| 86 | 613 022 1773 | SPRING.GUIDE SUPPLY |
| 87 | 613 022 4224 | FTE HEAD |

* Front loading mechanism have STANDARD TYPE and A TYPE.

## STANDARD TYPE


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
16
16
17
17
18
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
33
33
34
34
34
35
36
38
39
40
41
41
41
41
41
41
42
43
43
43
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
74
75
76
77
77
78
78
79
80
81
82
83
84
85
86
87

## A TYPE



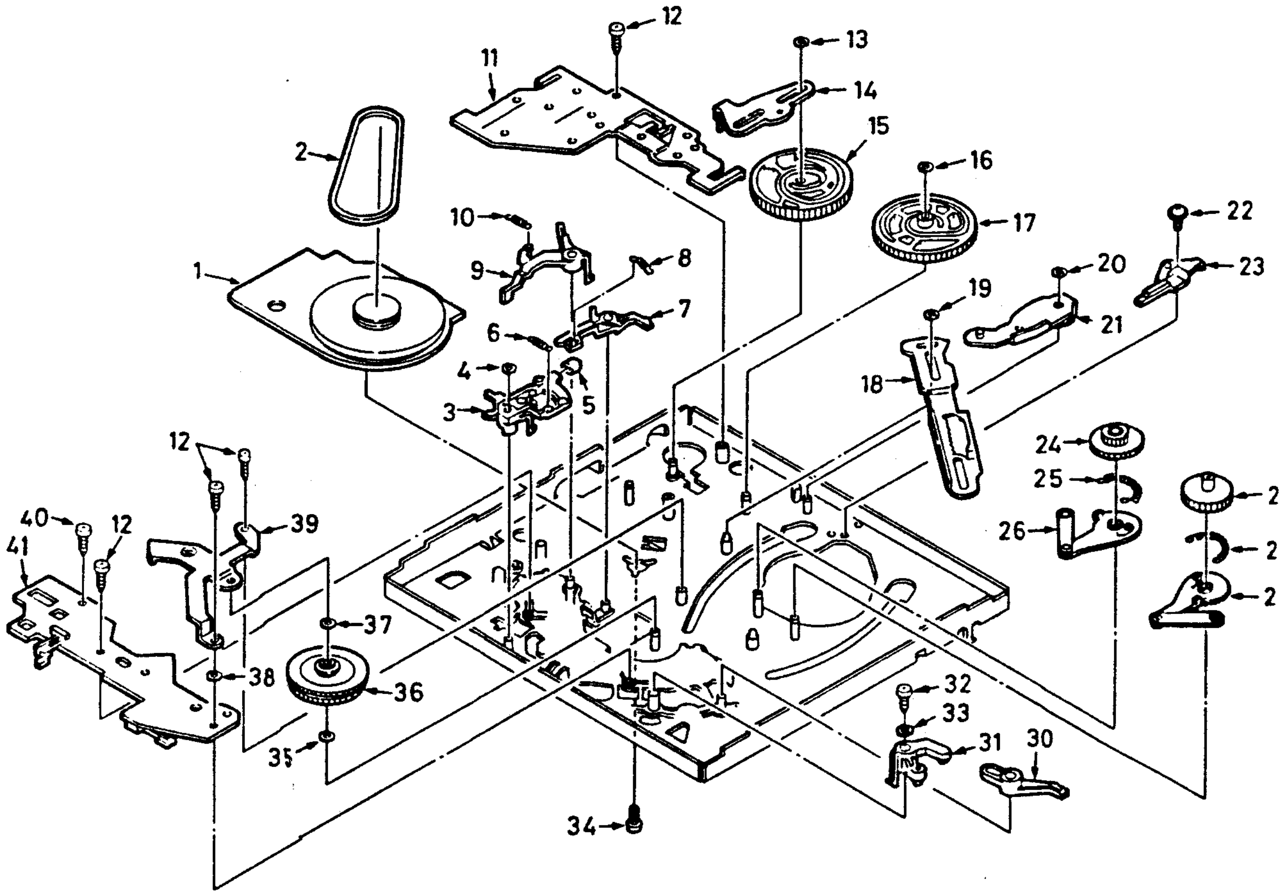
NOTE :

1. A type is not used Location No. 33, 34, 35, & 36.
2. A type is changed to Location No. 44-A & 47-A from Location No. 44 & 47.
3. Other parts of A type is used same parts to standard type.

A TYPE mecanism is used :

| | SERIAL NO. | |
|---|---|---|
| | From | TO |
| VHR4100EX | 75110001 ~ | 75110500 |
| VHR-4100G | Not Used | |
| VHR-4100EV | Not Used | |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| **MACHANISM PARTS 3** | | |
| 1 | 613 022 4484 | MOTOR.CAPSTAN |
| OR | 613 080 8912 | MOTOR.CAPSTAN |
| 2 | 613 022 2978 | BELT.REEL DRIVE |
| 3 | 613 021 9848 | ASSY.LEVER.CLUTCH |
| 4 | 411 015 4301 | RING CS 3 |
| 5 | 613 079 1023 | DAMPER.LEVER CLUTCH |
| 6 | 613 022 1520 | SPRING.LEVER CLUTCH |
| 7 | 613 022 2053 | LEVER.CHANGE CLUTCH |
| 8 | 613 022 1711 | SPRING.CHANGE CLUTCH |
| 9 | 613 081 7518 | ASSY.BRAKE.CAPSTAN |
| 10 | 613 022 1513 | SPRING.CAPSTAN |
| 11 | 613 022 0837 | BRACKET.REINFORCE |
| 12 | 411 021 3107 | SCR S-TPG BIN 2.6X8 |
| 13 | 411 109 2008 | WASHER Y 3.1X8X0.5 |
| 14 | 613 021 9978 | ASSY.SLIDE.CAM PLATE |
| 15 | 613 022 2701 | CAM.MODE |
| 16 | 411 109 1902 | WASHER Y 3.1X6X0.5 |
| 17 | 613 022 2718 | CAM.MAIN |
| 18 | 613 022 2664 | RACK.LOAD |
| 19 | 411 109 1803 | WASHER Y 2.6X6X0.5 |
| 20 | 411 109 2206 | WASHER Y 3.6X8X0.5 |
| 21 | 613 021 9794 | ASSY.LEVER.CAM LOAD |
| 22 | 411 047 6809 | SCR PAN+FLG 3X4 |
| 23 | 613 021 9763 | ASSY.EARTH.CYL |
| 24 | 613 022 2435 | GEAR.LOAD TAKE UP |
| 25 | 613 022 1551 | SPRING.GEAR LOAD |
| 26 | 613 021 9879 | ASSY.LEVER.LOAD T |
| 27 | 613 022 2428 | GEAR.LOAD SUPPLY |
| 28 | 613 022 1704 | SPRING |
| 29 | 613 021 9862 | ASSY.LEVER.LOAD S |
| 30 | 613 022 2039 | LEVER.RETURN TENSION |
| 31 | 613 021 9817 | ASSY.LEVER.CONTROL |
| 32 | 411 022 8903 | SCR S-TPG PAN 2.3X12 |
| 33 | 411 087 6005 | WASHER V 2.6X7.5X0.5 |
| 34 | 411 040 2303 | SCR PAN 2.6X5 |
| 35 | 412 015 8603 | SPECIAL WASHER |
| 36 | 613 022 0066 | ASSY.GEAR.FRICTION |
| 37 | 411 109 1605 | WASHER Y 2.6X6X0.25 |
| 38 | 411 102 9905 | WASHER Y 3.2X8X1 |
| 39 | 613 079 8121 | BRACKET.PULLEY |
| 40 | 411 100 0300 | SCR S-TPG BIN 2.6X5 |
| 41 | 613 077 9489 | COMPL.MC-1 |
| 41-1 | 401 024 6403 | CARBON 100 JA 1/6W R 3.INCLUDE MC-1 |
| 41-2 | 401 026 0607 | CARBON 270 JA 1/6W R 1.INCLUDE MC-1 |
| 41-3 | 613 022 4538 | SW.SPECIAL.FRONT END.INCLUDE MC-1 |
| 41-4 | 613 022 4545 | SPECIAL SWITCH.E-P.INCLUDE MC-1 |
| 41-5 | 407 094 1300 | PHOTO COUPLE SPI-315-04-C.INCLUDE MC-1 |
| 41-6 | 613 022 1155 | SPACER.PHOTO SENSOR.INCLUDE MC-1 |



# ELECTRICAL PARTS

**NOTE;**

*Materials of Capacitors and Resistors are abbreviated as follows;

| | |
|---|---|
| Resisteors | |
| MT-FILE | Metal Film Resistor |
| MT-GLAZE | Metal Glaze Resistor |
| OXIDE-MT | Oxide Netal Film Resistor |
| Capacitors | |
| MT-POLYEST | Metallized Pollyester Capacitor |
| MT-COMPO | Metallized Composite Capacitor |
| TA-SOLID | Tantalum Solid Cacacitor |
| AL-SOLID | Aliminium Solid Capacitor |
| NP-ELECT | Non-Polarized Electrolytic Capacitor |
| OS-SOLID | Aliminium Solid Capacitors with Organic Semiconductive |
| DL-ELECT | Double Layered Electrolytic Capacitor |

*Tolerance of Capacitor(10pF over) and Resistor are noted with follw symboles.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| F | ±1% | G | ±2% | J | ±5% | K | ±10% |
| M | ±20% | N | ±30% | Z | ±80% ······ −20% | | |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| COMPL.CP-A | | |
| COMPL.NO. | 613 079 3379 | VHR-4100G |
| COMPL.NO. | 613 079 3447 | VHR-4100EX.EV |
| VIDEO CIRCUIT | | |
| B1601 | 405 018 2501 | TR 2SC3399-AC |
| OR | 405 001 0408 | TR RN1204-TPE4 |
| B1602 | 405 018 2501 | TR 2SC3399-AC |
| OR | 405 001 0408 | TR RN1204-TPE4 |
| C1601 | 403 039 2609 | ELECT 47U M 6.3V |
| C1602 | 403 039 2609 | ELECT 47U M 6.3V |
| C1603 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C1604 | 403 038 2006 | ELECT 100U M 6.3V |
| C1605 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1606 | 403 039 3507 | ELECT 470U M 6.3V |
| C1607 | 403 042 3006 | ELECT 100U M 16V |
| C1608 | 403 022 7703 | CERAMIC 33P J 50V |
| C1609 | 403 024 1501 | CERAMIC 39P J 50V |
| C1610 | 403 043 9601 | ELECT 47U M 16V |
| C1611 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1612 | 403 038 5403 | ELECT 22U M 6.3V |
| C1616 | 403 001 1906 | CERAMIC 0.01U M 16V |
| CN161 | 613 009 1635 | SOCKET 21P |
| D1601 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D1602 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D1603 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D1604 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D1605 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D1606 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| IC161 | 409 003 4501 | IC BA7021 |
| L1601 | 613 015 6730 | HF CHOKE 100UH K |
| L1602 | 613 014 0975 | HF CHOKE 100UH K |
| L1603 | 613 015 6730 | HF CHOKE 100UH K |
| Q1601 | 405 004 4007 | TR 2SA608-E-SPA-AC |
| OR | 405 006 1707 | TR 2SA933S-TP-Q |
| Q1602 | 405 004 4007 | TR 2SA608-E-SPA-AC |
| OR | 405 004 4601 | TR 2SA608-F-SPA-AC |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| Q1602 | 405 006 1707 | TR 2SA933S-TP-Q |
| OR | 405 006 1806 | TR 2SA933S-T93-R |
| Q1603 | 405 004 4601 | TR 2SA608-F-SPA-AC |
| OR | 405 006 1806 | TR 2SA933S-T93-R |
| Q1604 | 405 019 2005 | TR 2SC536-E-SPA-AC |
| OR | 405 019 2807 | TR 2SC536-F-SPA-AC |
| OR | 405 011 8401 | TR 2SC1740S-DCTP-Q |
| OR | 405 011 8500 | TR 2SC1740S-DCTP-R |
| Q1605 | 405 004 4007 | TR 2SA608-E-SPA-AC |
| OR | 405 004 4601 | TR 2SA608-F-SPA-AC |
| OR | 405 006 1707 | TR 2SA933S-TP-Q |
| OR | 405 006 1806 | TR 2SA933S-T93-R |
| R1601 | 401 020 1907 | CARBON 4.7K JA 1/4W |
| R1602 | 401 022 6702 | CARBON 75 JA 1/4W |
| R1603 | 401 012 6903 | CARBON 10K JA 1/4W |
| R1604 | 401 012 6903 | CARBON 10K JA 1/4W |
| R1606 | 401 020 2805 | CARBON 47K JA 1/4W |
| R1607 | 401 020 2805 | CARBON 47K JA 1/4W |
| R1608 | 401 016 4707 | CARBON 22K JA 1/4W |
| R1610 | 401 021 2903 | CARBON 5.6K JA 1/4W |
| R1611 | 401 021 2903 | CARBON 5.6K JA 1/4W |
| R1612 | 401 016 4707 | CARBON 22K JA 1/4W |
| R1613 | 401 021 0602 | CARBON 56 JA 1/4W |
| R1614 | 401 013 5202 | CARBON 1.2K JA 1/4W |
| R1615 | 401 021 1807 | CARBON 560 JA 1/4W |
| R1616 | 401 012 4404 | CARBON 100 JA 1/4W |
| R1617 | 401 021 1807 | CARBON 560 JA 1/4W |
| R1618 | 401 022 6702 | CARBON 75 JA 1/4W |
| R1619 | 401 013 9408 | CARBON 1.3K JA 1/4W |
| R1620 | 401 021 2903 | CARBON 5.6K JA 1/4W |
| R1621 | 401 015 2605 | CARBON 1.8K JA 1/4W |
| R1622 | 401 012 5609 | CARBON 1K JA 1/4W |
| R1623 | 401 023 1607 | CARBON 820 JA 1/4W |
| R1624 | 401 015 2605 | CARBON 1.8K JA 1/4W |
| R1625 | 401 021 1807 | CARBON 560 JA 1/4W |
| R1628 | 401 012 6903 | CARBON 10K JA 1/4W |
| AUDIO CIRCUIT | | |
| C2151 | 403 070 7809 | CERAMIC 150P K 50V(VHR-4100G ONLY) |
| F2151 | 613 082 6046 | FILTER(VHR-4100G ONLY) |
| F2152 | 613 082 6039 | FILTER(VHR-4100G ONLY) |
| R2101 | 401 017 9701 | CARBON 30K JA 1/4W |
| R2102 | 401 019 7705 | CARBON 4.3K JA 1/4W |
| R2103 | 401 020 2805 | CARBON 47K JA 1/4W |
| R2104 | 401 019 7705 | CARBON 4.3K JA 1/4W |
| R2105 | 401 023 1607 | CARBON 820 JA 1/4W |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| R2107 | 401 017 1705 | CARBON 2.7K JA 1/4W |
| R2108 | 401 017 1705 | CARBON 2.7K JA 1/4W |
| R2109 | 401 023 1607 | CARBON 820 JA 1/4W |
| R2110 | 401 015 2605 | CARBON 1.8K JA 1/4W |

## SYSTEM CONTROL CIRCUIT

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C3041 | 403 069 1207 | CERAMIC 1000P K 50V |
| C3042 | 403 038 1603 | ELECT 100U M 6.3V |
| C3043 | 403 001 3108 | CERAMIC 0.1U Z 16V |
| C3044 | 403 001 3108 | CERAMIC 0.1U Z 16V |
| C3051 | 403 071 6207 | CERAMIC 220P K 50V |
| C3072 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C3073 | 403 038 1603 | ELECT 100U M 6.3V |
| C3074 | 403 022 7703 | CERAMIC 33P J 50V |
| C3075 | 403 022 7703 | CERAMIC 33P J 50V |
| C3076 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C3078 | 403 038 8602 | ELECT 33U M 6.3V |
| C3081 | 403 002 2506 | CERAMIC 0.01U M 25V |
| C3082 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C3111 | 403 069 1207 | CERAMIC 1000P K 50V |
| | | |
| CN301 | 613 009 4735 | SOCKET 26P |
| | | |
| D3001 | 407 078 2804 | DIODE 1SS245-T-77 |
| D3002 | 407 005 2303 | DIODE DS135E |
| OR | 407 005 1603 | DIODE DS135D |
| D3003 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D3051 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D3081 | 407 063 9504 | ZENER DIODE MTZJ8.2B-T-77 |
| OR | 407 070 8101 | ZENER DIODE GZS8.2Y-BT |
| D3082 | 407 099 5303 | ZENER DIODE MTZJ5.6B-T-77 |
| OR | 407 051 6904 | ZENER DIODE GZS5.6Y-BT |
| | | |
| IC301 | 410 047 2002 | IC LC66508B-3732 |
| IC302 | 409 114 4803 | IC LB1641 |
| IC303 | 409 057 3406 | IC UPC393C |
| OR | 409 018 3902 | IC LA6393D |
| OR | 409 003 3900 | IC BA6993 |
| IC306 | 409 032 3704 | IC MN1280-R |
| OR | 409 032 3803 | IC MN1280-S |
| | | |
| R3001 | 401 012 5708 | CARBON 1K JA 1/4W |
| R3013 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3014 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3022 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3027 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3028 | 401 012 6903 | CARBON 10K JA 1/4W |
| R3029 | 401 020 1907 | CARBON 4.7K JA 1/4W |
| R3030 | 401 020 1907 | CARBON 4.7K JA 1/4W |
| R3031 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3041 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3042 | 401 014 4006 | CARBON 1.5K JA 1/4W |
| R3043 | 401 017 9701 | CARBON 30K JA 1/4W |
| R3044 | 401 017 9701 | CARBON 30K JA 1/4W |
| R3045 | 401 022 3008 | CARBON 6.8K JA 1/4W |
| R3046 | 401 013 7206 | CARBON 120K JA 1/4W |
| R3051 | 401 023 4509 | CARBON 820K JA 1/4W |
| R3052 | 401 017 2702 | CARBON 27K JA 1/4W |
| R3053 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R3054 | 401 017 3709 | CARBON 270K JA 1/4W |
| R3055 | 401 018 4804 | CARBON 33K JA 1/4W |
| R3056 | 401 016 0006 | CARBON 20K JA 1/4W |
| R3057 | 401 016 4707 | CARBON 22K JA 1/4W |
| R3058 | 401 021 4006 | CARBON 56K JA 1/4W |
| R3059 | 401 014 6000 | CARBON 150K JA 1/4W |
| R3060 | 401 012 6903 | CARBON 10K JA 1/4W |
| R3074 | 401 020 1907 | CARBON 4.7K JA 1/4W |
| R3075 | 401 022 7105 | CARBON 750 JA 1/4W |
| R3083 | 401 022 7105 | CARBON 750 JA 1/4W |
| R3084 ⚠ | 402 036 4401 | FUSIBLE RES 3.3 JA 1/2W |
| R3091 | 401 012 8006 | CARBON 100K JA 1/4W |
| R3092 | 401 012 8006 | CARBON 100K JA 1/4W |
| R3093 | 401 012 8105 | CARBON 100K JA 1/4W |
| R3094 | 401 012 8105 | CARBON 100K JA 1/4W |
| R3095 | 401 012 8006 | CARBON 100K JA 1/4W |
| R3096 | 401 023 4509 | CARBON 820K JA 1/4W |
| R3097 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3098 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3099 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3100 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3101 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3102 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3111 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3113 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3114 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3115 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3116 | 401 012 5708 | CARBON 1K JA 1/4W |
| R3124 | 401 016 4707 | CARBON 22K JA 1/4W |
| R3125 | 401 017 9701 | CARBON 30K JA 1/4W |
| R3133 | 401 015 3800 | CARBON 18K JA 1/4W |
| R3134 | 401 012 5708 | CARBON 1K JA 1/4W |
| R3151 | 401 020 2805 | CARBON 47K JA 1/4W |
| R3171 | 401 012 8006 | CARBON 100K JA 1/4W |
| | | |
| RB301 | 613 078 5770 | RESISTOR PACK 4.7KX3 |
| OR | 613 079 3997 | RESISTOR PACK |
| OR | 613 079 5922 | R-NETWORK.4.7KX3 |
| RB302 | 613 078 5763 | RESISTOR PACK 3.9KX3 |
| OR | 613 079 3980 | RESISTOR PACK |
| OR | 613 079 5915 | R-NETWORK.3.9KX3 |
| RB303 | 613 078 5763 | RESISTOR PACK 3.9KX3 |
| OR | 613 079 3980 | RESISTOR PACK |
| OR | 613 079 5915 | R-NETWORK.3.9KX3 |
| | | |
| XF301 | 613 016 6869 | CERAMIC RESONATOR 4MHZ |
| OR | 613 016 7026 | CERAMIC RESONATOR 4MHZ |

## SERVO CIRCUIT

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| B3901 | 405 018 2600 | TR 2SC3400-AC |
| OR | 405 000 4407 | TR DTC124ES-DCTP |
| B3902 | 405 003 7900 | TR 2SA1348-AC |
| OR | 405 000 0508 | TR DTA114ES-DCTP |
| | | |
| C3501 | 403 059 6502 | POLYESTER 0.022U K 50V |
| C3502 | 403 002 8201 | CERAMIC 0.015U J 25V |
| C3503 | 403 004 3006 | CERAMIC 6800P J 25V |
| C3505 | 403 002 8201 | CERAMIC 0.015U J 25V |
| C3506 | 403 038 5403 | ELECT 22U M 6.3V |
| C3507 | 403 038 5403 | ELECT 22U M 6.3V |
| C3508 | 403 003 1102 | CERAMIC 2200P J 25V |
| C3509 | 403 002 7204 | CERAMIC 1500P K 25V |
| C3510 | 403 004 3006 | CERAMIC 6800P J 25V |
| C3511 | 403 038 5403 | ELECT 22U M 6.3V |
| C3512 | 403 038 5403 | ELECT 22U M 6.3V |
| C3513 | 403 057 7501 | POLYESTER 0.012U K 50V |
| C3514 | 403 071 6207 | CERAMIC 220P K 50V |
| C3515 | 403 041 9405 | ELECT 10U M 16V |
| C3516 | 403 050 7102 | ELECT 3.3U M 50V |
| C3517 | 403 003 1102 | CERAMIC 2200P J 25V |
| C3518 | 403 085 6002 | NP-ELECT 33U M 16V |
| C3519 | 403 069 0309 | CERAMIC 1000P J 50V |
| C3520 | 403 098 5405 | POLYESTER 0.039U K 50V |
| C3521 | 403 062 0405 | POLYESTER 0.047U K 50V |
| C3522 | 403 057 2902 | POLYESTER 0.1U K 50V |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C3523 | 403 057 9000 | POLYESTER 0.12U J 50V |
| C3526 | 403 086 2607 | NP-ELECT 1U M 50V |
| C3527 | 403 002 1509 | CERAMIC 0.01U J 25V |
| C3528 | 403 048 2508 | ELECT 0.22U M 50V |
| C3529 | 403 069 0309 | CERAMIC 1000P J 50V |
| C3530 | 403 049 0800 | ELECT 1U M 50V |
| C3531 | 403 001 1609 | CERAMIC 0.01U K 16V |
| C3533 | 403 039 2609 | ELECT 47U M 6.3V |
| C3534 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C3537 | 403 039 2609 | ELECT 47U M 6.3V |
| C3538 | 403 039 2609 | ELECT 47U M 6.3V |
| C3539 | 403 004 4409 | CERAMIC 0.068U J 25V |
| C3540 | 403 058 9504 | POLYESTER 0.018U J 50V |
| C3541 | 403 069 1207 | CERAMIC 1000P K 50V |
| D3501 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3502 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3503 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3504 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3901 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D3902 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| IC351 | 409 154 2708 | IC LC7417-8074 |
| IC352 | 409 155 2806 | IC LA7122 |
| Q3501 | 405 019 2807 | TR 2SC536-F-SPA-AC |
| OR | 405 011 8401 | TR 2SC1740S-DCTP-Q |
| Q3503 | 405 024 9907 | TR 2SD734-F-AA |
| OR | 405 024 9709 | TR 2SD734-E-AA |
| Q3901 | 405 019 2708 | TR 2SC536-F-NP-AA |
| OR | 405 011 8500 | TR 2SC1740S-DCTP-R |
| R3501 | 401 018 4804 | CARBON 33K JA 1/4W |
| R3502 | 401 012 8006 | CARBON 100K JA 1/4W |
| R3503 | 401 012 8006 | CARBON 100K JA 1/4W |
| R3506 | 401 018 5702 | CARBON 330K JA 1/4W |
| R3507 | 401 014 5102 | CARBON 15K JA 1/4W |
| R3508 | 401 014 6000 | CARBON 150K JA 1/4W |
| R3509 | 401 020 2805 | CARBON 47K JA 1/4W |
| R3510 | 401 020 2805 | CARBON 47K JA 1/4W |
| R3511 | 401 012 6903 | CARBON 10K JA 1/4W |
| R3512 | 401 018 5702 | CARBON 330K JA 1/4W |
| R3513 | 401 017 2702 | CARBON 27K JA 1/4W |
| R3514 | 401 014 6000 | CARBON 150K JA 1/4W |
| R3516 | 401 017 3709 | CARBON 270K JA 1/4W |
| R3518 | 401 016 4707 | CARBON 22K JA 1/4W |
| R3519 | 401 016 4707 | CARBON 22K JA 1/4W |
| R3520 | 401 020 9200 | CARBON 510K JA 1/4W |
| R3522 | 401 016 5704 | CARBON 220K JA 1/4W |
| R3525 | 401 018 7508 | CARBON 360 JA 1/4W |
| R3526 | 401 020 7800 | CARBON 510 JA 1/4W |
| R3527 | 401 020 7800 | CARBON 510 JA 1/4W |
| R3528 | 401 014 6000 | CARBON 150K JA 1/4W |
| R3529 | 401 012 6903 | CARBON 10K JA 1/4W |
| R3531 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3532 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R3533 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R3538 | 401 012 6903 | CARBON 10K JA 1/4W |
| R3539 | 401 014 4006 | CARBON 1.5K JA 1/4W |
| R3540 | 401 012 6903 | CARBON 10K JA 1/4W |
| R3541 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3542 | 401 012 6903 | CARBON 10K JA 1/4W |
| R3544 | 401 012 8006 | CARBON 100K JA 1/4W |
| R3545 | 401 014 6000 | CARBON 150K JA 1/4W |
| R3546 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3547 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3548 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3549 | 401 014 6000 | CARBON 150K JA 1/4W |
| R3561 | 401 012 8105 | CARBON 100K JA 1/4W |
| R3562 | 401 016 4707 | CARBON 22K JA 1/4W |
| R3563 | 401 016 0006 | CARBON 20K JA 1/4W |
| R3901 | 401 017 1705 | CARBON 2.7K JA 1/4W |
| R3902 | 401 016 4707 | CARBON 22K JA 1/4W |
| R3903 | 401 018 3708 | CARBON 3.3K JA 1/4W |
| R3904 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| VR351 | 613 001 9110 | SEMI VR 220KB |
| OR | 613 001 9462 | SEMI VR 200KB |

### POWER SUPPLY CIRCUIT

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| B5401 | 405 018 2808 | TR 2SC3402-AC |
| OR | 405 000 3103 | TR DTC114ES-DCTP |
| C5401 | 403 001 1609 | CERAMIC 0.01U K 16V |
| D5401 | 407 078 2705 | DIODE 1SS244-T-77 |
| D5402 | 407 053 6209 | ZENER DIODE MTZ5.1A-T-77 |
| D5403 | 407 078 2705 | DIODE 1SS244-T-77 |
| F5401 ⚠ | 423 011 8405 | FUSE 0.315A 250V |
| Q5401 | 405 007 3106 | TR 2SB544-F-MP-AE |
| Q5402 | 405 016 9601 | TR 2SC3070-AE |
| R5401 | 401 021 8905 | CARBON 6.2K JA 1/4W |
| R5402 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R5403 | 401 019 7200 | CARBON 430 JA 1/4W |

### TUNER CIRCUIT

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C6001 | 403 067 5603 | MT-COMPO 0.1U J 50V |
| OR | 403 065 8002 | MT-POLYEST 0.1U J 63V |
| C6002 | 403 046 9905 | ELECT 4.7U M 25V |
| C6003 | 403 049 0008 | ELECT 1U M 50V |
| C6004 | 403 067 5603 | MT-COMPO 0.1U J 50V |
| OR | 403 065 8002 | MT-POLYEST 0.1U J 63V |
| C6005 | 403 046 9905 | ELECT 4.7U M 25V |
| L6002 | 613 014 0852 | HF CHOKE 10UH K |
| L6003 | 613 014 0852 | HF CHOKE 10UH K |
| L6004 | 613 014 0852 | HF CHOKE 10UH K |
| L6006 | 613 014 0852 | HF CHOKE 10UH K |
| R6001 | 401 019 0904 | CARBON 390 JA 1/4W |
| R6002 | 401 019 0904 | CARBON 390 JA 1/4W |
| R6004 | 401 019 3905 | CARBON 390K JA 1/4W |
| R6005 | 401 020 3802 | CARBON 470K JA 1/4W |

### TIMER CIRCUIT

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C7001 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C7002 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C7003 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C7004 | 403 050 2800 | ELECT 22U M 50V |
| C7005 | 403 071 2001 | CERAMIC 180P K 50V |
| C7006 | 403 067 5603 | MT-COMPO 0.1U J 50V |
| OR | 403 065 8002 | MT-POLYEST 0.1U J 63V |
| C7007 | 403 067 7300 | MT-COMPO 0.33U J 50V |
| OR | 403 115 1007 | MT-POLYEST 0.33U J 63V |
| D7001 | 407 007 9904 | DIODE GMA01-BT |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| D7001 | 407 012 4406 | DIODE 1SS133-T-77 |
| D7002 | 407 053 3109 | ZENER DIODE MTZ12A-T-77 |
| IC701 | 409 148 5005 | IC M6M80021P |
| OR | 409 151 7904 | IC M6M80011P |
| IC702 | 409 019 6209 | IC LA7910 |
| IC703 | 409 026 8203 | IC L5631 |
| OR | 409 057 5103 | IC UPC574J |
| Q7001 | 405 016 5009 | TR 2SC2960-F |
| Q7002 | 405 006 7006 | TR 2SA984K-E-AA |
| OR | 405 006 7204 | TR 2SA984K-F-AA |
| R7001 | 401 019 1901 | CARBON 3.9K JA 1/4W |
| R7002 | 401 012 6903 | CARBON 10K JA 1/4W |
| R7003 | 401 012 6903 | CARBON 10K JA 1/4W |
| R7004 | 401 018 4804 | CARBON 33K JA 1/4W |
| R7005 | 401 020 2805 | CARBON 47K JA 1/4W |
| R7006 | 401 016 4707 | CARBON 22K JA 1/4W |
| R7007 | 401 020 1907 | CARBON 4.7K JA 1/4W |
| R7008 | 401 023 1607 | CARBON 820 JA 1/4W |
| R7009 | 401 018 3708 | CARBON 3.3K JA 1/4W |
| R7010 | 401 014 5102 | CARBON 15K JA 1/4W |

### RF CONVERTER CIRCUIT

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C6601 | 403 038 1603 | ELECT 100U M 6.3V |
| C6602 | 403 038 1603 | ELECT 100U M 6.3V |
| D6601 | 407 004 9709 | DIODE DSK10C-BT |
| OR | 407 005 8701 | DIODE ERA15-02A-V5 |
| L6601 | 613 015 6631 | HF CHOKE 15UH K |
| L6602 | 613 015 6631 | HF CHOKE 15UH K |

### COMPL,VD-1

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| COMPL.NO. | 613 077 1810 | |
| B1001 | 405 003 7207 | TR 2SA1342-TB |
| OR | 405 000 1109 | TR DTA124EK-T96 |
| B1002 | 405 018 2006 | TR 2SC3396-TB |
| B1201 | 405 018 2006 | TR 2SC3396-TB |
| B1202 | 405 018 2006 | TR 2SC3396-TB |
| C1002 | 403 134 7509 | CERAMIC 5P J 50V |
| C1003 | 403 024 7206 | CERAMIC 390P J 50V |
| C1004 | 403 009 5807 | CERAMIC 100P J 50V |
| C1005 | 403 026 2902 | CERAMIC 47P J 50V |
| C1006 | 403 048 6902 | ELECT 0.47U M 50V |
| C1007 | 403 033 4609 | CERAMIC 82P J 50V |
| C1008 | 403 017 5004 | CERAMIC 200P J 50V |
| C1009 | 403 048 6902 | ELECT 0.47U M 50V |
| C1010 | 403 048 6902 | ELECT 0.47U M 50V |
| C1011 | 403 048 4809 | ELECT 0.33U M 50V |
| C1012 | 403 022 8304 | CERAMIC 33P J 50V |
| C1013 | 403 011 5000 | CERAMIC 120P J 50V |
| C1014 | 403 009 5807 | CERAMIC 100P J 50V |
| C1016 | 403 063 2200 | POLYESTER 0.068U K 50V |
| C1017 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1018 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1019 | 403 068 0409 | CERAMIC 0.1U Z 25V |
| C1020 | 403 039 2609 | ELECT 47U M 6.3V |
| C1021 | 403 050 0509 | ELECT 2.2U M 50V |
| C1022 | 403 041 9405 | ELECT 10U M 16V |
| C1023 | 403 050 0509 | ELECT 2.2U M 50V |
| C1024 | 403 024 2102 | CERAMIC 39P J 50V |
| C1025 | 403 031 2201 | CERAMIC 680P J 50V |
| C1026 | 403 048 6902 | ELECT 0.47U M 50V |
| C1027 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1028 | 403 017 1006 | CERAMIC 20P J 50V |
| C1029 | 403 074 3104 | CERAMIC 0.047U Z 50V |
| C1101 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1102 | 403 041 2109 | ELECT 47U M 10V |
| C1103 | 403 041 2109 | ELECT 47U M 10V |
| C1104 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1105 | 403 049 0800 | ELECT 1U M 50V |
| C1106 | 403 022 8304 | CERAMIC 33P J 50V |
| C1107 | 403 134 7509 | CERAMIC 5P J 50V |
| C1108 | 403 028 4201 | CERAMIC 56P J 50V |
| C1109 | 403 051 0607 | ELECT 4.7U M 50V |
| C1110 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1111 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1112 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1113 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1201 | 403 028 0203 | CERAMIC 51P J 50V |
| C1202 | 403 073 4201 | CERAMIC 3900P K 50V |
| C1203 | 403 049 0800 | ELECT 1U M 50V |
| C1204 | 403 012 6907 | CERAMIC 15P J 50V |
| C1205 | 403 059 6007 | POLYESTER 0.022U K 50V |
| C1206 | 403 049 0800 | ELECT 1U M 50V |
| C1207 | 403 024 2102 | CERAMIC 39P J 50V |
| C1208 | 403 074 3104 | CERAMIC 0.047U Z 50V |
| C1209 | 403 039 2609 | ELECT 47U M 6.3V |
| C1210 | 403 028 0203 | CERAMIC 51P J 50V |
| C1211 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1212 | 403 017 5004 | CERAMIC 200P J 50V |
| C1213 | 403 049 0800 | ELECT 1U M 50V |
| C1214 | 403 013 3103 | CERAMIC 150P J 50V |
| C1215 | 403 013 3103 | CERAMIC 150P J 50V |
| C1216 | 403 002 2902 | CERAMIC 0.01U M 25V |
| C1217 | 403 074 3104 | CERAMIC 0.047U Z 50V |
| C1218 | 403 009 5807 | CERAMIC 100P J 50V |
| C1219 | 403 049 0800 | ELECT 1U M 50V |
| C1220 | 403 039 2708 | ELECT 47U M 6.3V |
| C1221 | 403 074 3104 | CERAMIC 0.047U Z 50V |
| C1222 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1223 | 403 072 1607 | CERAMIC 0.022U K 50V |
| C1224 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1225 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1226 | 403 049 0800 | ELECT 1U M 50V |
| C1227 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1228 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1229 | 403 022 2708 | CERAMIC 30P J 50V |
| C1230 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1231 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1232 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1233 | 403 028 9909 | CERAMIC 560P J 50V |
| C1234 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1235 | 403 069 5710 | CERAMIC 0.01U K 50V |
| C1236 | 403 069 5601 | CERAMIC 0.01U K 50V |
| C1237 | 403 013 3103 | CERAMIC 150P J 50V |
| C1238 | 403 020 8108 | CERAMIC 3P C 50V |
| C1239 | 403 040 2209 | ELECT 22U M 10V |
| C1501 | 403 049 0800 | ELECT 1U M 50V |
| C1502 | 403 038 9708 | ELECT 330U M 6.3V |
| C1503 | 403 047 0604 | ELECT 4.7U M 25V |
| C1504 | 403 039 2609 | ELECT 47U M 6.3V |
| D1001 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D1101 | 407 070 8408 | ZENER DIODE GZS9.1Y-TB |
| OR | 407 053 8906 | ZENER DIODE MTZ9.1C-T-77 |
| D1102 | 407 051 7802 | ZENER DIODE GZS7.5Y-BT |
| OR | 407 053 8104 | ZENER DIODE MTZ7.5C-T-77 |
| D1501 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| D1502 | 407 051 6706 | ZENER DIODE GZS5.1Y-BT |
| OR | 407 053 6407 | ZENER DIODE MTZ5.1C-T-77 |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| D1503 | 407 003 4507 | DIODE DAP202K-T-96 |
| DL121 | 613 077 4118 | DELAY.2H |
| F1001 | 613 004 5539 | LC PACK 4MHZ LPF |
| F1201 | 613 079 2402 | FILTER |
| F1202 | 613 082 5551 | FILTER 1.4MHZ LPF |
| IC101 | 409 156 6902 | IC LA7322-N |
| IC111 | 409 148 4800 | IC TL8709P |
| IC121 | 409 074 5803 | IC TA8632N |
| J1051 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1052 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1053 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1054 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1055 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1056 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1057 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1058 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1059 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1060 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1061 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1062 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1063 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1064 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1065 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1066 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1067 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1068 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1069 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1070 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1071 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1073 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1074 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1075 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1076 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| J1077 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1078 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1079 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1080 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1081 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1082 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1083 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1084 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1085 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1086 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1087 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| J1088 | 401 037 5004 | MT-GLAZE 0.000 ZA 1/10W |
| L1001 | 613 014 1187 | HF CHOKE |
| L1002 | 613 015 6730 | HF CHOKE 100UH K |
| L1003 | 613 014 0975 | HF CHOKE 100UH K |
| L1101 | 613 014 0944 | HF CHOKE 56UH K |
| L1102 | 613 014 0913 | HF CHOKE 33UH K |
| L1201 | 613 014 1118 | HF CHOKE 18UH J |
| L1202 | 613 014 1088 | HF CHOKE 10UH J |
| L1203 | 613 014 0999 | HF CHOKE 150UH K |
| L1204 | 613 014 0906 | HF CHOKE 27UH K |
| L1205 | 613 014 0876 | HF CHOKE 15UH K |
| L1209 | 613 015 7409 | HF CHOKE 100UH K |
| Q1001 | 405 001 9906 | TR 2SA1037K-T96-FQ |
| OR | 405 002 6508 | TR 2SA1179-M5-TB |
| OR | 405 002 6706 | TR 2SA1179-M6-TB |
| OR | 405 002 0001 | TR 2SA1037K-FR-T96 |
| Q1002 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| Q1002 | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1003 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |
| OR | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1101 | 405 001 9906 | TR 2SA1037K-T96-FQ |
| OR | 405 002 6508 | TR 2SA1179-M5-TB |
| OR | 405 002 6706 | TR 2SA1179-M6-TB |
| OR | 405 002 0001 | TR 2SA1037K-FR-T96 |
| Q1102 | 405 001 9906 | TR 2SA1037K-T96-FQ |
| OR | 405 002 6508 | TR 2SA1179-M5-TB |
| OR | 405 002 6706 | TR 2SA1179-M6-TB |
| OR | 405 002 0001 | TR 2SA1037K-FR-T96 |
| Q1201 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |
| OR | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1202 | 405 001 9906 | TR 2SA1037K-T96-FQ |
| OR | 405 002 6508 | TR 2SA1179-M5-TB |
| OR | 405 002 6706 | TR 2SA1179-M6-TB |
| OR | 405 002 0001 | TR 2SA1037K-FR-T96 |
| Q1203 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |
| OR | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1204 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |
| OR | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1205 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |
| OR | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1206 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |
| OR | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1501 | 405 043 6000 | TR 2SC3807 |
| Q1502 | 405 006 6504 | TR 2SA984-E-AA |
| OR | 405 006 6702 | TR 2SA984-F-AA |
| Q1503 | 405 014 4004 | TR 2SC2412K-T96-BQ |
| OR | 405 015 8407 | TR 2SC2812-L5-TB |
| OR | 405 015 8704 | TR 2SC2812-L6-TB |
| OR | 405 014 4103 | TR 2SC2412K-BR-T96 |
| Q1504 | 405 006 6504 | TR 2SA984-E-AA |
| OR | 405 006 6702 | TR 2SA984-F-AA |
| Q1505 | 405 009 7003 | TR 2SB985-T-AE |
| Q1506 | 405 019 2005 | TR 2SC536-E-SPA-AC |
| OR | 405 019 2807 | TR 2SC536-F-SPA-AC |
| OR | 405 011 8401 | TR 2SC1740S-DCTP-Q |
| OR | 405 011 8500 | TR 2SC1740S-DCTP-R |
| Q1507 | 405 006 6504 | TR 2SA984-E-AA |
| OR | 405 006 6702 | TR 2SA984-F-AA |
| Q1508 | 405 019 3903 | TR 2SC536-G-SPA-AC |
| OR | 405 019 2807 | TR 2SC536-F-SPA-AC |
| OR | 405 011 8500 | TR 2SC1740S-DCTP-R |
| OR | 405 011 8609 | TR 2SC1740S-DCTP-S |
| R1001 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1002 | 401 038 2101 | MT-GLAZE 2.7K JA 1/10W |
| R1003 | 401 038 9001 | MT-GLAZE 680 JA 1/10W |
| R1004 | 401 038 7601 | MT-GLAZE 560 JA 1/10W |
| R1005 | 401 037 5806 | MT-GLAZE 1M JA 1/10W |
| R1006 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1007 | 401 038 3009 | MT-GLAZE 3K JA 1/10W |
| R1008 | 401 038 6406 | MT-GLAZE 4.7K JA 1/10W |
| R1009 | 401 039 0908 | MT-GLAZE 910 JA 1/10W |
| R1010 | 401 038 0107 | MT-GLAZE 2K JA 1/10W |
| R1011 | 401 037 5806 | MT-GLAZE 1M JA 1/10W |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| R1012 | 401 037 5806 | MT-GLAZE 1M JA 1/10W |
| R1013 | 401 038 9704 | MT-GLAZE 7.5K JA 1/10W |
| R1014 | 401 039 0403 | MT-GLAZE 8.2K JA 1/10W |
| R1015 | 401 037 6704 | MT-GLAZE 1.2K JA 1/10W |
| R1018 | 401 038 3702 | MT-GLAZE 33K JA 1/10W |
| R1019 | 401 037 8104 | MT-GLAZE 150K JA 1/10W |
| R1020 | 401 022 1806 | CARBON 680 JA 1/4W |
| R1021 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1022 | 401 037 8005 | MT-GLAZE 15K JA 1/10W |
| R1023 | 401 038 3108 | MT-GLAZE 30K JA 1/10W |
| R1024 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1025 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1026 | 401 037 9200 | MT-GLAZE 1.8K JA 1/10W |
| R1027 | 401 038 6604 | MT-GLAZE 470K JA 1/10W |
| R1028 | 401 035 4900 | MT-GLAZE 1K JA 1/8W |
| R1029 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R1030 | 401 035 4108 | MT-GLAZE 0.000 ZA 1/8W |
| R1101 | 401 020 7404 | CARBON 51 JA 1/4W |
| R1102 | 401 021 1807 | CARBON 560 JA 1/4W |
| R1103 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1104 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1105 | 401 038 0701 | MT-GLAZE 2.2K JA 1/10W |
| R1106 | 401 020 7404 | CARBON 51 JA 1/4W |
| R1107 | 401 019 9501 | CARBON 47 JA 1/4W |
| R1201 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1202 | 401 038 6505 | MT-GLAZE 47K JA 1/10W |
| R1203 | 401 038 5102 | MT-GLAZE 3.9K JA 1/10W |
| R1204 | 401 035 5204 | MT-GLAZE 10K JA 1/8W |
| R1205 | 401 038 6406 | MT-GLAZE 4.7K JA 1/10W |
| R1206 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1207 | 401 038 3801 | MT-GLAZE 330K JA 1/10W |
| R1208 | 401 038 3207 | MT-GLAZE 300K JA 1/10W |
| R1209 | 401 038 3702 | MT-GLAZE 33K JA 1/10W |
| R1210 | 401 038 3009 | MT-GLAZE 3K JA 1/10W |
| R1211 | 401 038 0107 | MT-GLAZE 2K JA 1/10W |
| R1212 | 401 038 3009 | MT-GLAZE 3K JA 1/10W |
| R1213 | 401 038 6307 | MT-GLAZE 470 JA 1/10W |
| R1214 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1215 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1216 | 401 038 7601 | MT-GLAZE 560 JA 1/10W |
| R1217 | 401 038 3504 | MT-GLAZE 330 JA 1/10W |
| R1218 | 401 012 5609 | CARBON 1K JA 1/4W |
| R1219 | 401 037 8005 | MT-GLAZE 15K JA 1/10W |
| R1220 | 401 037 8005 | MT-GLAZE 15K JA 1/10W |
| R1221 | 401 038 2002 | MT-GLAZE 270 JA 1/10W |
| R1222 | 401 037 7909 | MT-GLAZE 1.5K JA 1/10W |
| R1223 | 401 036 5104 | MT-GLAZE 33K JA 1/8W |
| R1224 | 401 038 6307 | MT-GLAZE 470 JA 1/10W |
| R1225 | 401 037 7909 | MT-GLAZE 1.5K JA 1/10W |
| R1226 | 401 038 3603 | MT-GLAZE 3.3K JA 1/10W |
| R1227 | 401 037 8609 | MT-GLAZE 1.6K JA 1/10W |
| R1229 | 401 038 7601 | MT-GLAZE 560 JA 1/10W |
| R1230 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1231 | 401 038 7601 | MT-GLAZE 560 JA 1/10W |
| R1232 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1233 | 401 037 6803 | MT-GLAZE 12K JA 1/10W |
| R1234 | 401 037 5400 | MT-GLAZE 1K JA 1/10W |
| R1235 | 401 035 6607 | MT-GLAZE 120 JA 1/8W |
| R1236 | 401 035 4900 | MT-GLAZE 1K JA 1/8W |
| R1237 | 401 038 9001 | MT-GLAZE 680 JA 1/10W |
| R1238 | 401 038 9001 | MT-GLAZE 680 JA 1/10W |
| R1241 | 401 037 5608 | MT-GLAZE 10K JA 1/10W |
| R1242 | 401 038 3603 | MT-GLAZE 3.3K JA 1/10W |
| R1501 | 401 036 8105 | MT-GLAZE 470 JA 1/8W |
| R1502 | 401 038 2101 | MT-GLAZE 2.7K JA 1/10W |
| R1503 | 401 038 6406 | MT-GLAZE 4.7K JA 1/10W |
| R1504 | 401 038 6505 | MT-GLAZE 47K JA 1/10W |
| R1505 | 401 038 6505 | MT-GLAZE 47K JA 1/10W |
| R1506 | 401 038 2101 | MT-GLAZE 2.7K JA 1/10W |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| R1507 | 401 038 2101 | MT-GLAZE 2.7K JA 1/10W |
| R1508 | 401 036 2806 | MT-GLAZE 2.7K JA 1/8W |
| R1509 | 401 036 1403 | MT-GLAZE 220 JA 1/8W |
| R1510 | 401 035 9301 | MT-GLAZE 1.8K JA 1/8W |
| R1511 | 401 038 6505 | MT-GLAZE 47K JA 1/10W |
| R1512 | 401 020 2805 | CARBON 47K JA 1/4W |
| R1513 | 401 038 6406 | MT-GLAZE 4.7K JA 1/10W |
| R1514 | 401 038 9308 | MT-GLAZE 68K JA 1/10W |
| R1515 | 401 038 6406 | MT-GLAZE 4.7K JA 1/10W |
| R1516 | 401 038 6406 | MT-GLAZE 4.7K JA 1/10W |
| | | |
| VR101 | 613 001 9424 | SEMI VR 20KB |
| OR | 613 001 9059 | SEMI VR 22KB |
| VR102 | 613 001 9417 | SEMI VR 10KB |
| OR | 613 001 9035 | SEMI VR 10KB |
| VR103 | 613 001 9394 | SEMI VR 3KB |
| OR | 613 001 9004 | SEMI VR 3.3KB |
| VR104 | 613 001 9417 | SEMI VR 10KB |
| OR | 613 001 9035 | SEMI VR 10KB |
| VR111 | 613 001 9370 | SEMI VR 1KB |
| OR | 613 001 8977 | SEMI VR 1KB |
| VR121 | 613 001 9448 | SEMI VR 50KB |
| OR | 613 001 9073 | SEMI VR 47KB |
| | | |
| X1201 | 613 002 7818 | CRYSTAL 4.433619MHZ 16PF |
| OR | 613 002 7900 | CRYSTAL |

**COMPL,VD-2**
COMPL.NO. 613 078 6197

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C1301 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1302 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1303 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1304 | 403 039 2609 | ELECT 47U M 6.3V |
| C1305 | 403 030 6309 | CERAMIC 68P J 50V |
| C1306 | 403 046 2104 | ELECT 3.3U M 25V |
| C1307 | 403 046 2104 | ELECT 3.3U M 25V |
| C1308 | 403 047 0604 | ELECT 4.7U M 25V |
| C1309 | 403 038 2006 | ELECT 100U M 6.3V |
| | | |
| D1301 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE 6MA01-BT |
| D1302 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE 6MA01-BT |
| | | |
| IC131 | 409 074 3502 | IC LA7311 |
| | | |
| L1301 | 613 015 6730 | HF CHOKE 100UH K |
| | | |
| R1301 | 401 013 6308 | CARBON 12K JA 1/4W |
| R1302 | 401 012 9201 | CARBON 1M JA 1/4W |
| R1303 | 401 012 5609 | CARBON 1K JA 1/4W |
| R1304 | 401 013 6308 | CARBON 12K JA 1/4W |
| R1305 | 401 012 9201 | CARBON 1M JA 1/4W |
| R1306 | 401 012 6903 | CARBON 10K JA 1/4W |
| R1307 | 401 023 1607 | CARBON 820 JA 1/4W |
| R1308 | 401 105 3701 | CARBON 18K JA 1/4W |
| R1309 | 401 016 4707 | CARBON 22K JA 1/4W |
| R1310 | 401 016 4707 | CARBON 22K JA 1/4W |

**COMPL,VP-1**
COMPL.NO. 613 077 1735

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C1801 | 403 072 8200 | CERAMIC 330P K 50V |
| C1802 | 403 068 9402 | CERAMIC 100P K 50V |
| C1803 | 403 003 3304 | CERAMIC 0.022U M 25V |
| C1804 | 403 049 0800 | ELECT 1U M 50V |
| C1805 | 403 003 1805 | CERAMIC 2200P M 25V |
| C1806 | 403 003 7104 | CERAMIC 0.033U M 25V |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C1807 | 403 009 1809 | CERAMIC 10P J 50V |
| C1808 | 403 014 2600 | CERAMIC 18P J 50V |
| C1809 | 403 003 7104 | CERAMIC 0.033U M 25V |
| C1810 | 403 003 1805 | CERAMIC 2200P M 25V |
| C1811 | 403 039 2609 | ELECT 47U M 6.3V |
| C1812 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1813 | 403 014 2600 | CERAMIC 18P J 50V |
| C1814 | 403 075 3103 | CERAMIC 82P J 50V |
| C1815 | 403 071 2001 | CERAMIC 180P K 50V |
| C1816 | 403 022 7703 | CERAMIC 33P J 50V |
| C1817 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1818 | 403 043 9601 | ELECT 47U M 16V |
| C1819 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1820 | 403 003 3304 | CERAMIC 0.022U M 25V |
| C1821 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1822 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C1823 | 403 069 1207 | CERAMIC 1000P K 50V |
| D1801 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| IC181 | 409 134 2001 | IC LA7320 |
| L1801 | 613 014 0968 | HF CHOKE 82UH K |
| L1802 | 613 014 0951 | HF CHOKE 68UH K |
| L1803 | 613 015 6730 | HF CHOKE 100UH K |
| L1804 | 613 014 0883 | HF CHOKE 18UH K |
| L1805 | 613 014 0876 | HF CHOKE 15UH K |
| L1806 | 613 014 1033 | HF CHOKE 3.9UH J |
| L1807 | 613 014 0937 | HF CHOKE 47UH K |
| L1808 | 613 015 6730 | HF CHOKE 100UH K |
| Q1801 | 405 016 1100 | TR 2SC2839-F-SPA-AC |
| OR | 405 016 0905 | TR 2SC2839-E-SPA-AC |
| OR | 405 015 2603 | TR 2SC2669-Y-TPE4 |
| OR | 405 015 2504 | TR 2SC2669-O-TPE4 |
| OR | 405 012 9506 | TR 2SC2058S-DCTP-Q |
| Q1802 | 405 016 1100 | TR 2SC2839-F-SPA-AC |
| OR | 405 016 0905 | TR 2SC2839-E-SPA-AC |
| OR | 405 015 2603 | TR 2SC2669-Y-TPE4 |
| OR | 405 015 2504 | TR 2SC2669-O-TPE4 |
| OR | 405 012 9506 | TR 2SC2058S-DCTP-Q |
| Q1803 | 405 016 1100 | TR 2SC2839-F-SPA-AC |
| OR | 405 016 0905 | TR 2SC2839-E-SPA-AC |
| OR | 405 015 2603 | TR 2SC2669-Y-TPE4 |
| OR | 405 015 2504 | TR 2SC2669-O-TPE4 |
| OR | 405 012 9506 | TR 2SC2058S-DCTP-Q |
| R1801 | 401 013 5202 | CARBON 1.2K JA 1/4W |
| R1802 | 401 016 2505 | CARBON 220 JA 1/4W |
| R1804 | 401 020 5509 | CARBON 5.1 JA 1/4W |
| R1806 | 401 013 5202 | CARBON 1.2K JA 1/4W |
| R1807 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R1808 | 401 020 0702 | CARBON 470 JA 1/4W |
| R1809 | 401 019 0904 | CARBON 390 JA 1/4W |
| R1810 | 401 012 4404 | CARBON 100 JA 1/4W |
| R1811 | 401 021 1807 | CARBON 560 JA 1/4W |
| R1812 | 401 023 1607 | CARBON 820 JA 1/4W |
| R1813 | 401 019 0904 | CARBON 390 JA 1/4W |
| R1814 | 401 019 0904 | CARBON 390 JA 1/4W |
| R1815 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R1816 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R1817 | 401 012 5609 | CARBON 1K JA 1/4W |
| R1818 | 401 015 1509 | CARBON 180 JA 1/4W |
| VR181 | 613 002 0345 | SEMI VR 1KB |
| VR182 | 613 002 0345 | SEMI VR 1KB |

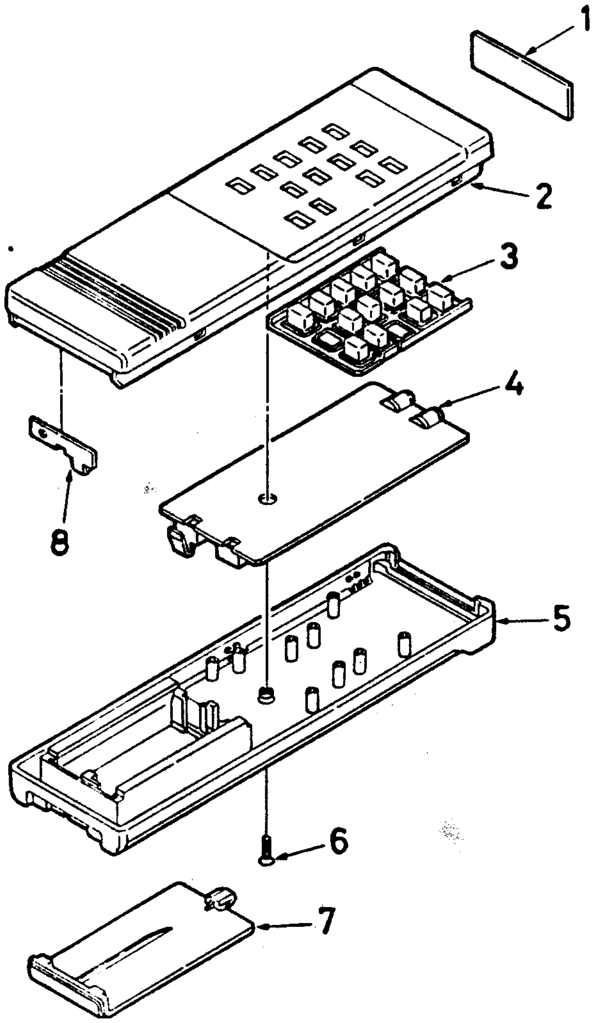
| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| COMPL.AD-1 | | |
| COMPL.NO. | 613 079 7421 | VHR-4100G |
| COMPL.NO. | 613 079 7438 | VHR-4100EX.EV |
| C2001 | 403 049 0008 | ELECT 1U M 50V |
| C2002 | 403 075 4506 | CERAMIC 820P K 50V |
| C2004 | 403 038 8602 | ELECT 33U M 6.3V |
| C2005 | 403 003 0600 | CERAMIC 0.018U K 25V |
| C2006 | 403 048 6308 | ELECT 0.47U M 50V |
| C2007 | 403 001 7007 | CERAMIC 3900P K 16V |
| C2008 | 403 001 6505 | CERAMIC 3300P K 16V |
| C2009 | 403 039 2104 | ELECT 47U M 6.3V |
| C2010 | 403 041 8804 | ELECT 10U M 16V |
| C2013 | 403 003 2406 | CERAMIC 0.022U J 25V |
| C2015 | 403 046 9905 | ELECT 4.7U M 25V |
| C2016 | 403 049 0008 | ELECT 1U M 50V |
| C2017 | 403 043 3906 | ELECT 33U M 16V |
| C2018 | 403 046 9905 | ELECT 4.7U M 25V |
| C2019 | 403 043 9106 | ELECT 47U M 16V |
| C2020 | 403 071 6207 | CERAMIC 220P K 50V |
| C2021 | 403 081 7409 | POLYPRO 0.033U J 100V |
| C2022 | 403 002 1905 | CERAMIC 0.01U K 25V |
| C2024 | 403 002 1905 | CERAMIC 0.01U K 25V |
| C2025 | 403 003 3700 | CERAMIC 0.022U Z 25V |
| C2030 | 403 049 0008 | ELECT 1U M 50V |
| C2031 | 403 049 0008 | ELECT 1U M 50V |
| C2032 | 403 049 0008 | ELECT 1U M 50V |
| C2033 | 403 043 3906 | ELECT 33U M 16V |
| C2034 | 403 049 0008 | ELECT 1U M 50V |
| C2051 | 403 069 1207 | CERAMIC 1000P K 50V.<br>VHR-4100G ONLY |
| C2052 | 403 001 4006 | CERAMIC 1500P M 16V.<br>VHR-4100G ONLY |
| C2053 | 403 068 9402 | CERAMIC 100P K 50V.<br>VHR-4100G ONLY |
| C2054 | 403 068 9402 | CERAMIC 100P K 50V.<br>VHR-4100G ONLY |
| C2075 | 403 046 1602 | ELECT 3.3U M 25V |
| D2002 | 407 012 4406 | DIODE 1SS133-T-77 |
| OR | 407 007 9904 | DIODE GMA01-BT |
| IC201 | 409 133 1401 | IC LA7294 |
| IC202 | 409 018 7603 | IC LA7016 |
| L2001 | 613 015 5474 | HF CHOKE 27MH |
| L2002 | 613 014 3037 | HF CHOKE 10MH J |
| L2003 | 613 015 8550 | CHOKE COIL |
| L2051 | 613 017 0316 | CORE VHR-4100G ONLY |
| L2052 | 613 017 0316 | CORE VHR-4100G ONLY |
| L2053 | 613 015 7492 | HF CHOKE 560UH K.VHR-4100G ONLY |
| Q2001 | 405 024 9709 | TR 2SD734-E-AA |
| OR | 405 024 9907 | TR 2SD734-F-AA |
| R2001 | 401 012 4404 | CARBON 100 JA 1/4W |
| R2002 | 401 022 3008 | CARBON 6.8K JA 1/4W |
| R2003 | 401 013 4106 | CARBON 120 JA 1/4W |
| R2004 | 401 019 3905 | CARBON 390K JA 1/4W |
| R2005 | 401 021 8905 | CARBON 6.2K JA 1/4W |
| R2006 | 401 017 1705 | CARBON 2.7K JA 1/4W |
| R2007 | 401 023 2703 | CARBON 8.2K JA 1/4W |
| R2008 | 401 017 1705 | CARBON 2.7K JA 1/4W |
| R2009 | 401 018 6501 | CARBON 3.3M JA 1/4W |
| R2010 | 401 012 6903 | CARBON 10K JA 1/4W |
| R2011 | 401 023 7401 | CARBON 9.1K JA 1/4W |
| R2012 | 401 019 7705 | CARBON 4.3K JA 1/4W |
| R2013 | 401 012 5609 | CARBON 1K JA 1/4W |
| R2014 | 401 015 2605 | CARBON 1.8K JA 1/4W |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| R2016 | 401 012 6903 | CARBON 10K JA 1/4W |
| R2017 | 401 012 6903 | CARBON 10K JA 1/4W |
| R2018 | 401 015 3800 | CARBON 18K JA 1/4W |
| R2021 | 401 012 3308 | CARBON 10 JA 1/4W |
| R2022 | 401 019 9501 | CARBON 47 JA 1/4W |
| R2023 | 401 014 5102 | CARBON 15K JA 1/4W |
| R2024 | 401 019 6104 | CARBON 4.7 JA 1/4W |
| R2034 | 401 012 4404 | CARBON 100 JA 1/4W |
| R2041 | 401 020 1907 | CARBON 4.7K JA 1/4W |
| | | |
| T2001 | 613 016 2205 | OSC COIL |
| | | |
| VR201 | 613 002 0468 | SEMI VR 100KB |
| VR202 | 613 002 0406 | SEMI VR 10KB |
| | | |
| SY-4 | | |
| COMPL.NO. | 613 080 9124 | |
| | | |
| B3301 | 405 063 9708 | TR DTC144EL-TL2 |
| B3302 | 405 063 9708 | TR DTC144EL-TL2 |
| B3303 | 405 063 9104 | TR DTA144EL-TL2 |
| | | |
| C3301 | 403 043 1902 | ELECT 2200MF M 16V |
| OR | 403 043 3104 | ELECT 2200MF M 16V |
| C3302 | 403 042 2405 | ELECT 100MF M 16V |
| | | |
| D3301 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3302 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3303 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3304 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3305 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3306 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3307 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3308 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3309 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D3310 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| | | |
| R3301 | 401 016 4707 | CARBON 22K JA 1/4W |
| R3302 | 401 019 1802 | CARBON 3.9K JA 1/4W |
| R3303 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3304 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3305 | 401 012 5609 | CARBON 1K JA 1/4W |
| R3307 | 401 012 6903 | CARBON 10K JA 1/4W |
| | | |
| COMPL.PW-1 | | |
| COMPL.NO. | 613 077 1803 | VHR-4100G |
| COMPL.NO. | 613 080 3627 | VHR-4100EX.EV |
| | | |
| | 613 052 5543 | FUSE HOLDER |
| | 613 041 5967 | COVER.F5001 |
| | 613 041 5967 | COVER.F5102 |
| | | |
| C5001 ⚠ | 404 031 1201 | MT-COMPO 4700P M 250V |
| C5101 | 403 046 0605 | ELECT 2200U M 25V |
| OR | 403 045 9807 | ELECT 2200U M 25V |
| C5102 | 403 046 0605 | ELECT 2200U M 25V |
| OR | 403 045 9807 | ELECT 2200U M 25V |
| C5103 | 403 097 6304 | ELECT 4700U M 16V |
| OR | 403 044 3509 | ELECT 4700U M 16V |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C5104 | 403 051 3103 | ELECT 47U M 50V |
| C5105 | 403 110 1408 | ELECT 47U M 100V |
| C5106 | 403 051 0607 | ELECT 4.7U M 50V |
| C5107 | 403 054 0703 | ELECT 47U M 35V |
| C5108 | 403 039 2104 | ELECT 47U M 6.3V |
| C5109 | 403 043 9106 | ELECT 47U M 16V |
| C5110 | 403 043 6006 | ELECT 330U M 16V |
| | | |
| D5101 | 407 004 9709 | DIODE DSK10C-BT |
| OR | 407 005 8701 | DIODE ERA15-02A-V5 |
| D5102 | 407 004 9709 | DIODE DSK10C-BT |
| OR | 407 005 8701 | DIODE ERA15-02A-V5 |
| D5103 | 407 004 6708 | DIODE DSA17C-KC6 |
| D5104 | 407 004 6708 | DIODE DSA17C-KC6 |
| D5105 | 407 003 9205 | DIODE DBB10-C |
| D5106 | 407 078 2705 | DIODE 1SS244-T-77 |
| D5107 | 407 078 2705 | DIODE 1SS244-T-77 |
| D5108 | 407 078 1104 | ZENER DIODE MTZ33A-T-77 |
| OR | 407 051 6003 | ZENER DIODE GZS33X-BT |
| D5109 | 407 053 2706 | ZENER DIODE MTZ10C-T-77 |
| OR | 407 065 1704 | ZENER DIODE GZS10Y-BT |
| D5110 | 407 078 0305 | ZENER DIODE MTZ24B-T-77 |
| OR | 407 070 3502 | ZENER DIODE GZS24Y-BT |
| | | |
| F5001 ⚠ | 423 004 3004 | FUSE 400MA |
| F5101 ⚠ | 423 003 3708 | FUSE 800MA |
| F5102 ⚠ | 423 005 4901 | FUSE 1.6A |
| F5103 ⚠ | 423 006 1305 | FUSE 2A |
| F5104 ⚠ | 423 011 8405 | FUSE T315MA 250V |
| | | |
| L5001 ⚠ | 613 082 5568 | FILTER VHR-4100G ONLY |
| OR ⚠ | 613 013 1409 | LF CHOKE VHR-4100G ONLY |
| OR ⚠ | 613 080 0664 | LF CHOKE VHR-4100G ONLY |
| | | |
| Q5101 | 405 006 7204 | TR 2SA984K-F-AA |
| OR | 405 006 7006 | TR 2SA984K-E-AA |
| | | |
| R5102 | 401 019 7705 | CARBON 4.3K JA 1/4W |
| R5103 | 401 019 7705 | CARBON 4.3K JA 1/4W |
| R5104 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R5105 | 401 016 3700 | CARBON 2.2K JA 1/4W |
| R5107 | 401 019 7705 | CARBON 4.3K JA 1/4W |
| R5108 ⚠ | 402 023 2106 | FUSIBLE RES 47 JA 1/4W |
| R5109 | 401 013 6308 | CARBON 12K JA 1/4W |
| R5110 | 401 014 2804 | CARBON 150 JA 1/4W |
| R5111 | 401 014 2804 | CARBON 150 JA 1/4W |
| | | |
| COMPL.PW-2 | | |
| COMPL.NO. | 613 078 6579 | |
| | | |
| IC521 | 409 149 6704 | IC STK5473 |
| | | |
| COMPL.TM-1 | | |
| COMPL.NO. | 613 080 9568 | |
| | | |
| | 613 022 0875 | HOLDER.VFD |
| | | |
| A7101 | 613 022 4552 | VFD |
| | | |
| C7101 | 403 009 1809 | CERAMIC 10P J 50V |
| C7102 | 403 017 9705 | CERAMIC 22P J 50V |
| C7103 | 403 017 9705 | CERAMIC 22P J 50V |
| C7104 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C7105 | 403 042 8407 | ELECT 22U M 16V |
| C7106 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C7107 | 403 001 1906 | CERAMIC 0.01U M 16V |
| C7108 | 403 048 7107 | ELECT 0.47U M 50V |
| C7109 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C7110 | 403 069 0309 | CERAMIC 1000P J 50V |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| C7111 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C7112 | 403 001 1906 | CERAMIC 0.01U M 16V |
| CT711 | 613 002 6576 | TRIMMER 20P N450 |
| OR | 613 002 6583 | TRIMMER 20P N750 |
| D7101 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7102 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7103 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7104 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7105 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7107 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7108 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7109 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7110 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7122 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| D7127 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| IC711 | 409 152 4902 | IC M50957-632SP |
| IC712 | 409 032 3308 | IC MN1280-L |
| R7101 | 401 012 9201 | CARBON 1M JA 1/4W |
| R7102 | 401 012 9904 | CARBON 10M JA 1/4W |
| R7103 | 401 018 5702 | CARBON 330K JA 1/4W |
| R7104 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7106 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7108 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7110 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7113 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7116 | 401 016 4707 | CARBON 22K JA 1/4W |
| R7117 | 401 012 6903 | CARBON 10K JA 1/4W |
| R7118 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7119 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7120 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7122 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7123 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7124 | 401 018 4804 | CARBON 33K JA 1/4W |
| R7125 | 401 012 5609 | CARBON 1K JA 1/4W |
| RB711 | 613 017 2877 | RESISTOR PACK 10K X6 J |
| OR | 613 079 5892 | R-NETWORK.10KX6 |
| RB712 | 613 017 2853 | RESISTOR PACK 10K X4 J |
| OR | 613 079 5878 | R-NETWORK.10KX4 |
| RR711 | 613 000 2204 | REMOCON RECEIVER |
| S7101 | 613 006 3762 | PUSH SWITCH.PLAY |
| S7102 | 613 006 3762 | PUSH SWITCH.STOP |
| S7103 | 613 077 4354 | PUSH SWITCH.PAUSE |
| S7105 | 613 077 4354 | PUSH SWITCH.PROG. |
| S7106 | 613 077 4354 | PUSH SWITCH.UP |
| S7107 | 613 077 4354 | PUSH SWITCH.VPS |
| S7108 | 613 077 4354 | PUSH SWITCH.TR.UP |
| S7113 | 613 006 3991 | PUSH SWITCH.REC |
| S7114 | 613 006 3991 | PUSH SWITCH.EJECT |
| S7117 | 613 077 4354 | PUSH SWITCH.CLK |
| S7118 | 613 077 4354 | PUSH SWITCH.DOWN |
| S7120 | 613 077 4354 | PUSH SWITCH.TR.DOWN |
| S7125 | 613 006 3762 | PUSH SWITCH.REW |
| S7126 | 613 006 3762 | PUSH SWITCH.FF |
| S7129 | 613 077 4354 | PUSH SWITCH.PRESET |
| S7130 | 613 077 4354 | PUSH SWITCH.OK |
| S7137 | 613 077 4354 | PUSH SWITCH.ALL CLEAR |
| X7101 | 613 022 4569 | CRYSTAL 6.291456MHZ |
| X7102 | 613 002 8457 | CRYSTAL 32.768KHZ |
| OR | 613 002 8594 | CRYSTAL 32.768KHZ |
| COMPL.TM-3 | | |
| COMPL.NO. | 613 077 1599 | VHR-4100G.EV |
| COMPL.NO. | 613 080 9575 | VHR-4100EX |
| B7301 | 405 003 7603 | TR 2SA1345-AC |
| OR | 405 000 2205 | TR DTA144ES-DCTP |
| B7302 | 405 018 2501 | TR 2SC3399-AC |
| OR | 405 000 6104 | TR DTC144ES-DCTP |
| C7301 | 403 042 7707 | ELECT 22U M 16V |
| C7302 | 403 048 4205 | ELECT 0.33U M 50V |
| C7303 | 403 041 8804 | ELECT 10U M 16V |
| C7304 | 403 048 4205 | ELECT 0.33U M 50V |
| C7305 | 403 001 5003 | CERAMIC 2200P K 16V |
| C7306 | 403 069 1207 | CERAMIC 1000P K 50V |
| C7307 | 403 042 7707 | ELECT 22U M 16V |
| C7308 | 403 121 9509 | CERAMIC 0.1U Z 50V |
| C7309 | 403 057 2407 | POLYESTER 0.1U J 50V |
| C7310 | 403 003 6701 | CERAMIC 0.033U K 25V |
| C7311 | 403 155 2804 | DL-ELECT 0.047F Z 5.5V |
| C7312 | 403 070 7205 | CERAMIC 150P J 50V |
| D7301 | 407 007 9904 | DIODE GMA01-BT |
| OR | 407 012 4406 | DIODE 1SS133-T-77 |
| IC731 | 409 114 4308 | IC LA7214 |
| IC732 | 409 148 5104 | IC SDA5642.WITHOUT VHR-4100EX |
| Q7301 | 405 009 7003 | TR 2SB985-T-AE |
| Q7302 | 405 057 6409 | TR 2SC4038-R-TL2 |
| OR | 405 057 6300 | TR 2SC4038-S-TL2 |
| Q7303 | 405 027 8709 | TR 2SK68A-K |
| OR | 405 057 9301 | TR 2SK68A-L1 |
| R7301 | 401 020 2805 | CARBON 47K JA 1/4W |
| R7302 | 401 013 5202 | CARBON 1.2K JA 1/4W |
| R7303 | 401 012 5609 | CARBON 1K JA 1/4W |
| R7304 | 401 012 6903 | CARBON 10K JA 1/4W |
| R7305 | 401 012 9201 | CARBON 1M JA 1/4W |
| R7308 | 401 012 6903 | CARBON 10K JA 1/4W |
| R7309 | 401 020 3802 | CARBON 470K JA 1/4W |
| R7310 | 401 018 5702 | CARBON 330K JA 1/4W |
| R7311 | 401 018 2701 | CARBON 330 JA 1/4W |
| R7312 | 401 018 5702 | CARBON 330K JA 1/4W |
| R7313 | 401 017 3709 | CARBON 270K JA 1/4W |
| R7314 | 401 012 8006 | CARBON 100K JA 1/4W |
| R7315 | 401 012 6903 | CARBON 10K JA 1/4W |
| R7316 | 401 012 4404 | CARBON 100 JA 1/4W |
| R7317 | 401 021 2903 | CARBON 5.6K JA 1/4W |
| R7318 | 401 023 4509 | CARBON 820K JA 1/4W |
| R7319 | 401 012 8006 | CARBON 100K JA 1/4W |
| R7320 | 401 012 9201 | CARBON 1M JA 1/4W |
| R7321 | 401 017 8506 | CARBON 300 JA 1/4W |
| R7322 | 401 015 1509 | CARBON 180 JA 1/4W |
| R7323 | 401 023 4509 | CARBON 820K JA 1/4W |
| R7324 | 401 016 3700 | CARBON 2.2K JA 1/4W |

| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| COMPL.TB-1 | | |
| COMPL.NO. | 613 080 3610 | |
| VR851 | 613 080 5928 | VR.ROTARY 100K B |
| REMOCON | | |
| COMPL.NO. | 613 077 4385 | |
| 1 | 613 040 5180 | SIGN WINDOW |
| 2 | 613 080 0251 | ASSY.CABINET.TOP |
| 3 | 613 080 0299 | BUTTON |
| 4 | 613 080 0022 | COMPL.RM-1 |
| 5 | 613 040 0468 | BOTTOM LID |
| 6 | 411 101 7308 | SCR S-TPG FLT 2.6X10 |
| 7 | 613 040 1618 | BATTERY LID |
| 8 | 613 052 5321 | TERMINAL |



| LOCATION | PARTS NO. | DESCRIPTION |
|---|---|---|
| COMPL.RM-1 | | |
| COMPL.NO. | 613 080 0022 | |
| | 613 052 5338 | TERMINAL.POSITIVE |
| | 613 052 5345 | TERMINAL.NEGATIVE |
| C1 | 403 009 3100 | CERAMIC 100P J 50V |
| C2 | 403 009 3100 | CERAMIC 100P J 50V |
| C3 | 403 039 2104 | ELECT 47U M 6.3V |
| D1 | 407 007 9904 | DIODE GMA01 |
| OR | 407 012 4406 | DIODE 1SS133 |
| D2 | 407 007 9904 | DIODE GMA01 |
| OR | 407 012 4406 | DIODE 1SS133 |
| D3 | 407 007 9904 | DIODE GMA01 |
| OR | 407 012 4406 | DIODE 1SS133 |
| IC1 | 409 073 6207 | IC UPD6122G-001 |
| LED1 | 407 078 3207 | LED SLR938C |
| Q1 | 405 066 7305 | TR 2SC4040-R |
| OR | 405 015 3006 | TR 2SC2673-R |
| R1 | 401 012 4404 | CARBON 100 JA 1/4W |
| R2 | 401 012 1007 | CARBON 1.5 JA 1/4W |
| X1 | 613 016 6913 | CERAMIC RESONATOR |
| OR | 613 016 6920 | CERAMIC RESONATOR |

A11300 Apr./'88/2800 NS Printed in Japan

SANYO
SANYO Electric Co., Ltd.
Osaka, Japan

# BLOCK DIAGRAMS, CIRCUIT DIAGRAMS & PRINTED CIRCUIT BOARDS

# VHR-4100EX (Europe)
# VHR-4100EV (Europe)
# VHR-4100G (West Germany)

## TABLE OF CONTENTS

| | | |
|---|---|---|
| | OVERALL WIRING DIAGRAM<br>SERVO CIRCUIT BASIC BLOCK DIAGRAM | Ⓐ |
| | AUDIO CIRCUIT BASIC BLOCK DIAGRAM<br>VIDEO CIRCUIT BASIC BLOCK DIAGRAM | Ⓑ |
| COMPL. VD-1<br><br>COMPL. VD-2<br>COMPL. VP-1 | VIDEO CIRCUIT & P.C.B.<br>WAVEFORM OF VIDEO<br>VIDEO CIRCUIT & P.C.B.<br>VIDEO PRE-AMP CIRCUIT & P.C.B. | Ⓒ |
| COMPL. CP-A | MAIN CIRCUIT<br>IC 351 (LC7417) DIGITAL SERVO IC. INTER BLOCK DIAGRAM<br>WAVEFORM OF VIDEO | Ⓓ |
| CP-1<br>SY-4<br>TB-1<br>COMPL. AD-1 | MAIN P.C.B.<br>SY P.C.B.<br>TERMINAL P.C.B.<br>AUDIO CIRCUIT & P.C.B.<br>IR REMOTE CONTROL CIRCUIT | Ⓔ |
| COMPL. PW-1,2<br>COMPL. TM-1 | POWER SUPPLY CIRCUIT & P.C.B.<br>DISPLAY, TIMER, TUNING CONTROL CIRCUIT | Ⓕ |
| TM-1<br>COMPL. TM-3<br>COMPL. TN-1 | DISPLAY, TIMER, TUNING CONTROL P.C.B.<br>VPS, AFT CIRCUIT & P.C.B.<br>IF CIRCUIT & P.C.B. | Ⓖ |
| | RF CONVERTER CIRCUIT<br>MECHANISM CONNECTION CIRCUIT | Ⓗ |

A11300 DP1/EX, EV, G 84NS

REFERENCE NO. WM-22340

**NOTES:**

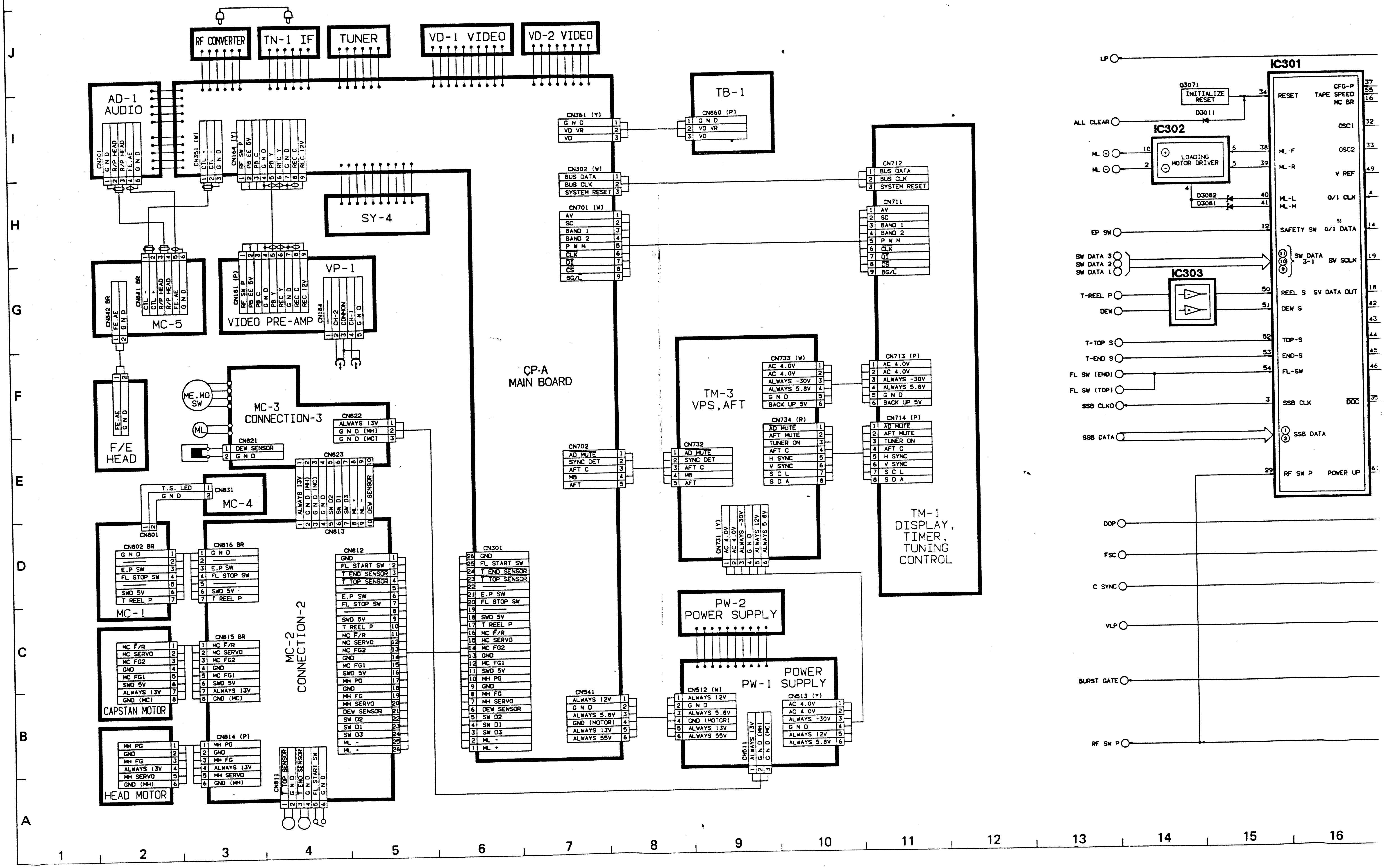
1. All resistance values in "OHMS" unless otherwise noted. (K=1,000 M=1,000,000)
2. All capacitance values in "µfd" unless otherwise noted. p=pico farad
3. All inductance values in "mH" unless otherwise noted. µ=micro henry

## PRODUCT SAFETY NOTICE

THE COMPONENTS DESIGNATED BY A SYMBOL (△) IN THIS SCHEMATIC DIAGRAM DESIGNATES COMPONENTS WHOSE VALUE ARE OF SPECIAL SIGNIFICANCE TO PRODUCT SAFETY. SHOULD ANY COMPONENT DESIGNATED BY A SYMBOL NEED TO BE REPLACED, USE ONLY THE PART DESIGNATED IN THE PARTS LIST. DO NOT DEVIATE FROM THE RESISTANCE, WATTAGE AND VOLTAGE RATINGS SHOWN.

A

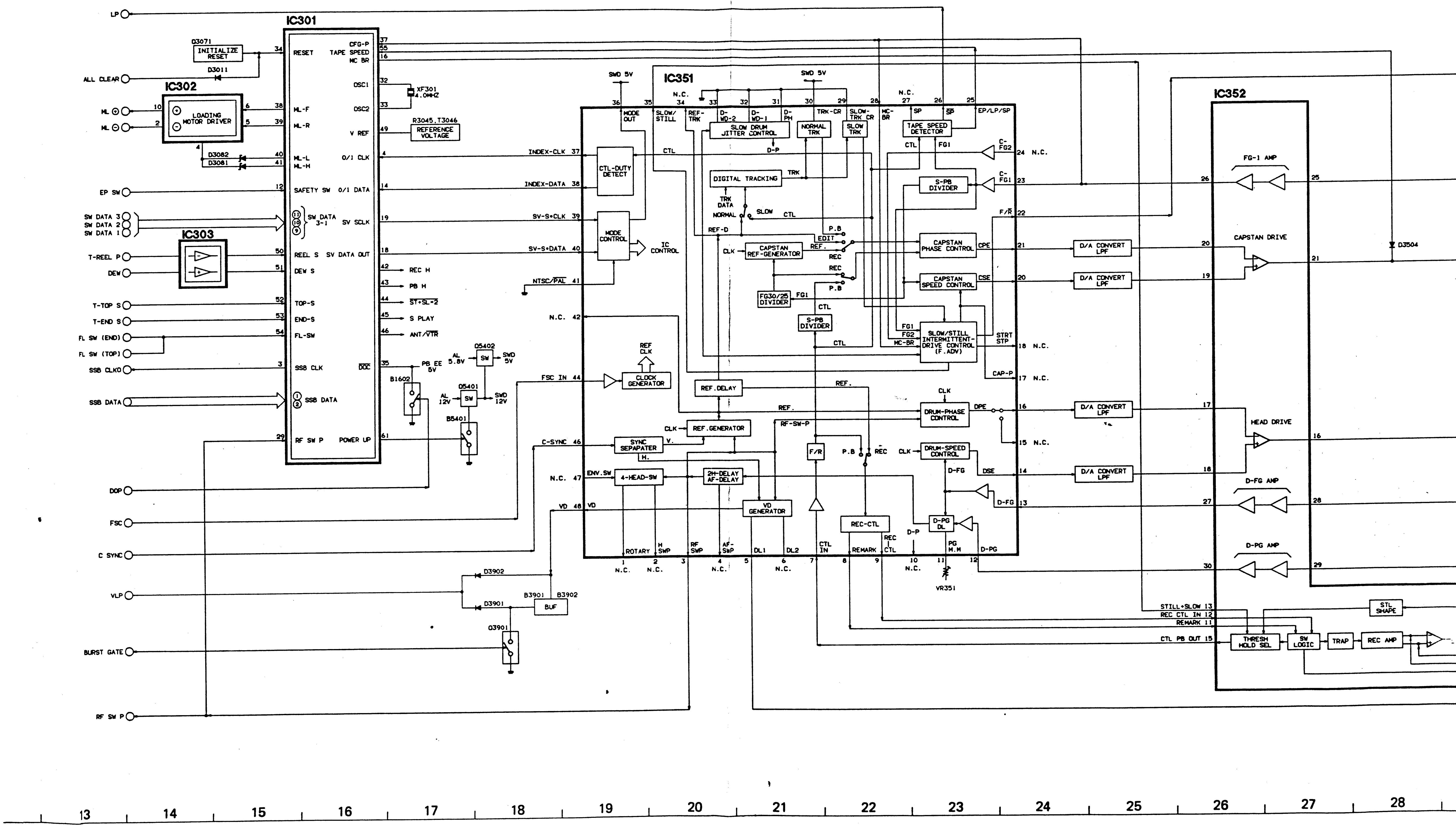
# OVERALL WIRING DIAGRAM



K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
RF CONVERTER
TN-1 IF
TUNER
VD-1 VIDEO
VD-2 VIDEO
AD-1 AUDIO
CN201
G N D
R/P HEAD
R/P HEAD
FE.AE
G N D
CN351 (W)
CTL +
CTL -
CN164 (Y)
RF SW P
PB EE 5V
PB C
G N D
PB Y
REC Y
G N D
REC C
R/C 12V
SY-4
CN361 (Y)
G N D
VD VR
VD
TB-1
CN860 (P)
G N D
VD VR
VD
CN302 (W)
BUS DATA
BUS CLK
SYSTEM RESET
CN712
BUS DATA
BUS CLK
SYSTEM RESET
CN701 (W)
AV
SC
BAND 1
BAND 2
P W M
CLK
DI
CS
BG/L
CN711
AV
SC
BAND 1
BAND 2
P W M
CLK
DI
CS
BG/L
MC-5
CN842 BR
FE.AE
G N D
CN841 BR
CTL -
CTL +
R/P HEAD
R/P HEAD
FE.AE
G N D
VP-1
CN181 (P)
RF SW P
PB EE 5V
PB C
G N D
PB Y
REC Y
G N D
REC C
REC 12V
VIDEO PRE-AMP
CN184
CH-2
COMMON
CH-1
G N D
F/E HEAD
FE.AE
G N D
ME.MO SW
ML
MC-3 CONNECTION-3
CN822
ALWAYS 13V
G N D (MH)
G N D (MC)
CN821
DEW SENSOR
G N D
CN823
CP-A MAIN BOARD
TM-3 VPS,AFT
CN733 (W)
AC 4.0V
AC 4.0V
ALWAYS -30V
ALWAYS 5.8V
G N D
BACK UP 5V
CN713 (P)
AC 4.0V
AC 4.0V
ALWAYS -30V
ALWAYS 5.8V
G N D
BACK UP 5V
CN734 (R)
AD MUTE
AFT MUTE
TUNER ON
AFT C
H SYNC
V SYNC
S C L
S D A
CN714 (P)
AD MUTE
AFT MUTE
TUNER ON
AFT C
H SYNC
V SYNC
S C L
S D A
CN702
AD MUTE
SYNC DET
AFT C
MB
AFT
CN732
AD MUTE
SYNC DET
AFT C
MB
AFT
CN731 (Y)
AC 4.0V
AC 4.0V
ALWAYS -30V
G N D
ALWAYS 12V
ALWAYS 5.8V
TM-1 DISPLAY, TIMER, TUNING CONTROL
T.S. LED
G N D
CN831
MC-4
CN801
CN813
ALWAYS 13V
G N D (MH)
G N D (MC)
G N D
SW D2
SW D1
SW D3
ML +
ML -
DEW SENSOR
CN802 BR
G N D
E.P SW
FL STOP SW
SWD 5V
T REEL P
MC-1
CN816 BR
G N D
E.P SW
FL STOP SW
SWD 5V
T REEL P
CN812
GND
FL START SW
T END SENSOR
T TOP SENSOR
E.P SW
FL STOP SW
SWD 5V
T REEL P
MC F/R
MC SERVO
MC FG2
GND
MC FG1
SWD 5V
MH PG
GND
MH FG
MH SERVO
DEW SENSOR
SW D2
SW D1
SW D3
ML -
ML +
MC-2 CONNECTION-2
CN301
GND
FL START SW
T END SENSOR
T TOP SENSOR
E.P SW
FL STOP SW
SWD 5V
T REEL P
MC F/R
MC SERVO
MC FG2
GND
MC FG1
SWD 5V
MH PG
GND
MH FG
MH SERVO
DEW SENSOR
SW D2
SW D1
SW D3
ML -
ML +
MC F/R
MC SERVO
MC FG2
GND
MC FG1
SWD 5V
ALWAYS 13V
GND (MC)
CAPSTAN MOTOR
CN815 BR
MC F/R
MC SERVO
MC FG2
GND
MC FG1
SWD 5V
ALWAYS 13V
GND (MC)
MH PG
GND
MH FG
ALWAYS 13V
MH SERVO
GND (MH)
HEAD MOTOR
CN814 (P)
MH PG
GND
MH FG
ALWAYS 13V
MH SERVO
GND (MH)
CN811
T TOP SENSOR
G N D
T END SENSOR
G N D
FL START SW
G N D
PW-2 POWER SUPPLY
CN541
ALWAYS 12V
G N D
ALWAYS 5.8V
GND (MOTOR)
ALWAYS 13V
ALWAYS 55V
PW-1 POWER SUPPLY
CN512 (W)
ALWAYS 12V
G N D
ALWAYS 5.8V
GND (MOTOR)
ALWAYS 13V
ALWAYS 55V
CN513 (Y)
AC 4.0V
AC 4.0V
ALWAYS -30V
G N D
ALWAYS 12V
ALWAYS 5.8V
CN511
ALWAYS 13V
G N D (MH)
G N D (MC)
LP
IC301
D3071
INITIALIZE RESET
D3011
ALL CLEAR
RESET
CFG-P
TAPE SPEED
MC BR
OSC1
OSC2
V REF
0/1 CLK
0/1 DATA
SV SCLK
SV DATA OUT
IC302
ML ⊕
ML ⊖
LOADING MOTOR DRIVER
ML-F
ML-R
D3082
D3081
ML-L
ML-H
EP SW
SAFETY SW
SW DATA 3
SW DATA 2
SW DATA 1
SW DATA 3-1
IC303
T-REEL P
DEW
REEL S
DEW S
T-TOP S
T-END S
TOP-S
END-S
FL SW (END)
FL SW (TOP)
FL-SW
SSB CLKO
SSB CLK
DOC
SSB DATA
SSB DATA
RF SW P
POWER UP
DOP
FSC
C SYNC
VLP
BURST GATE
RF SW P
34
37
55
16
32
33
49
10
2
6
5
38
39
4
40
41
14
12
19
18
50
42
51
43
52
44
53
45
54
46
3
35
29

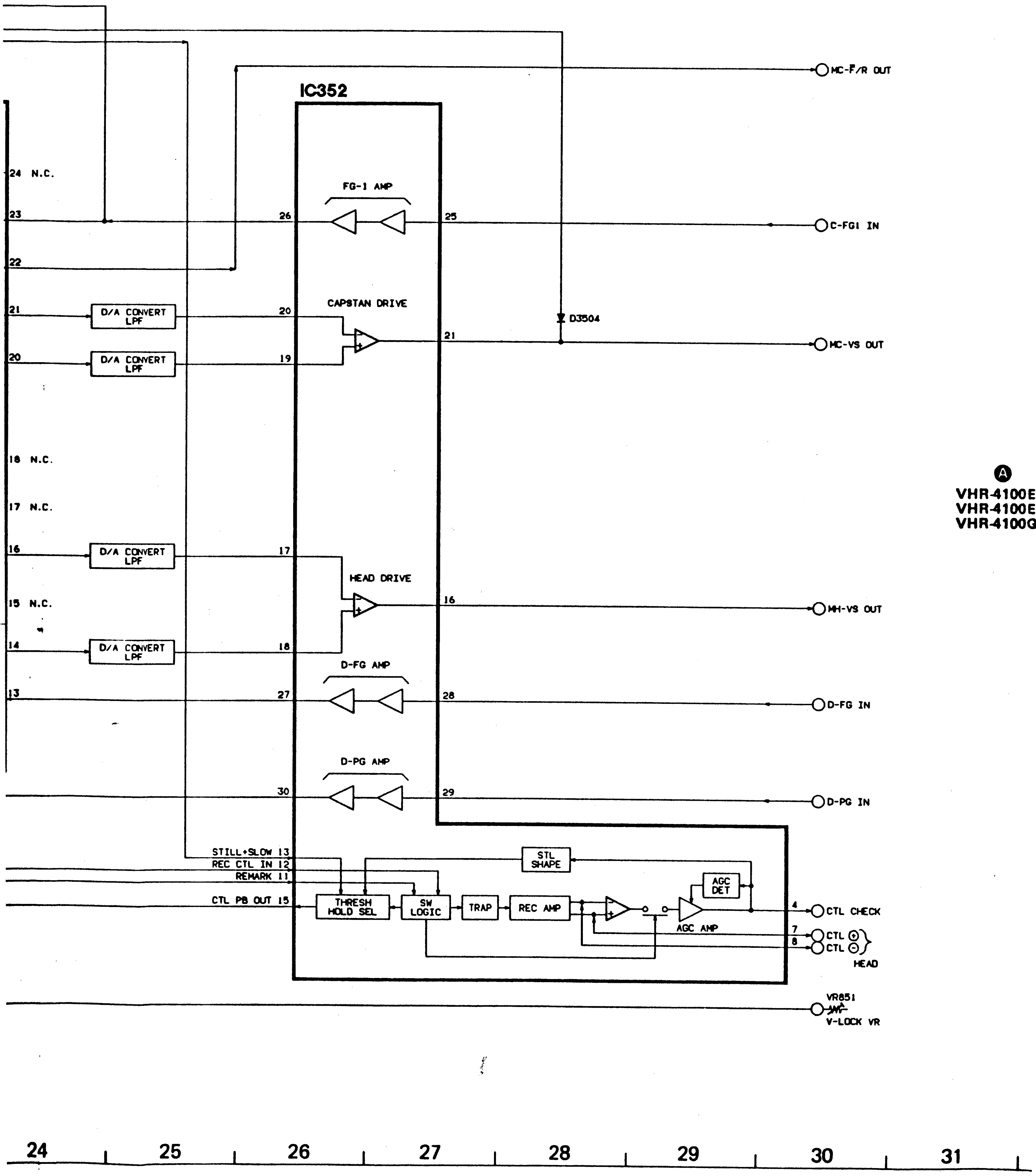
A

## SERVO CIRCUIT BASIC BLOCK DIAGRAM



IC301
IC302
IC303
IC351
IC352
LP
ALL CLEAR
ML
EP SW
SW DATA 3
SW DATA 2
SW DATA 1
T-REEL P
DEW
T-TOP S
T-END S
FL SW (END)
FL SW (TOP)
SSB CLKO
SSB DATA
DOP
FSC
C SYNC
VLP
BURST GATE
RF SW P
Q3071
INITIALIZE RESET
D3011
LOADING MOTOR DRIVER
D3082
D3081
RESET
ML-F
ML-R
ML-L
ML-H
SAFETY SW
SW DATA 3-1
REEL S
DEW S
TOP-S
END-S
FL-SW
SSB CLK
SSB DATA
RF SW P
CFG-P
TAPE SPEED
MC BR
OSC1
OSC2
V REF
0/1 CLK
0/1 DATA
SV SCLK
SV DATA OUT
DOC
POWER UP
XF301 4.0MHZ
R3045,T3046
REFERENCE VOLTAGE
REC H
PB H
ST+SL=2
S PLAY
ANT/VTR
PB EE 5V
AL 5.8V
Q5402
SW
SWD 5V
B1602
Q5401
AL 12V
SWD 12V
B5401
INDEX-CLK
INDEX-DATA
SV-S•CLK
SV-S•DATA
NTSC/PAL
N.C.
FSC IN
C-SYNC
VD
SWD 5V
MODE OUT
SLOW/STILL
REF-TRK
D-WD-2
D-WD-1
D-PH
TRK-CR
SLOW-TRK CR
MC-BR
SP
SP
EP/LP/SP
SLOW DRUM JITTER CONTROL
NORMAL TRK
SLOW TRK
TAPE SPEED DETECTOR
CTL-DUTY DETECT
MODE CONTROL
IC CONTROL
DIGITAL TRACKING
TRK
TRK DATA
NORMAL
SLOW
CTL
D-P
FG1
C-FG2
C-FG1
S-PB DIVIDER
F/R
REF-D
CLK
CAPSTAN REF-GENERATOR
EDIT
REF.
P.B
REC
CAPSTAN PHASE CONTROL
CPE
CAPSTAN SPEED CONTROL
CSE
FG30/25 DIVIDER
S-PB DIVIDER
FG2
MC-BR
SLOW/STILL INTERMITTENT-DRIVE CONTROL (F.ADV)
STRT STP
CAP-P
REF CLK
CLOCK GENERATOR
REF.DELAY
REF.GENERATOR
SYNC SEPAPATER
V.
H.
RF-SW-P
DRUM-PHASE CONTROL
DPE
DRUM-SPEED CONTROL
DSE
D-FG
ENV.SW
4-HEAD-SW
2H-DELAY AF-DELAY
VD GENERATOR
F/R
REC-CTL
D-PG DL
D-PG
ROTARY
H SWP
RF SWP
AF-SWP
DL1
DL2
CTL IN
REMARK
REC CTL
PG M.M
VR351
D3902
D3901
B3901
B3902
BUF
Q3901
D/A CONVERT LPF
FG-1 AMP
CAPSTAN DRIVE
HEAD DRIVE
D-FG AMP
D-PG AMP
D3504
STILL•SLOW
REC CTL IN
REMARK
CTL PB OUT
THRESH HOLD SEL
SW LOGIC
TRAP
REC AMP
STL SHAPE
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

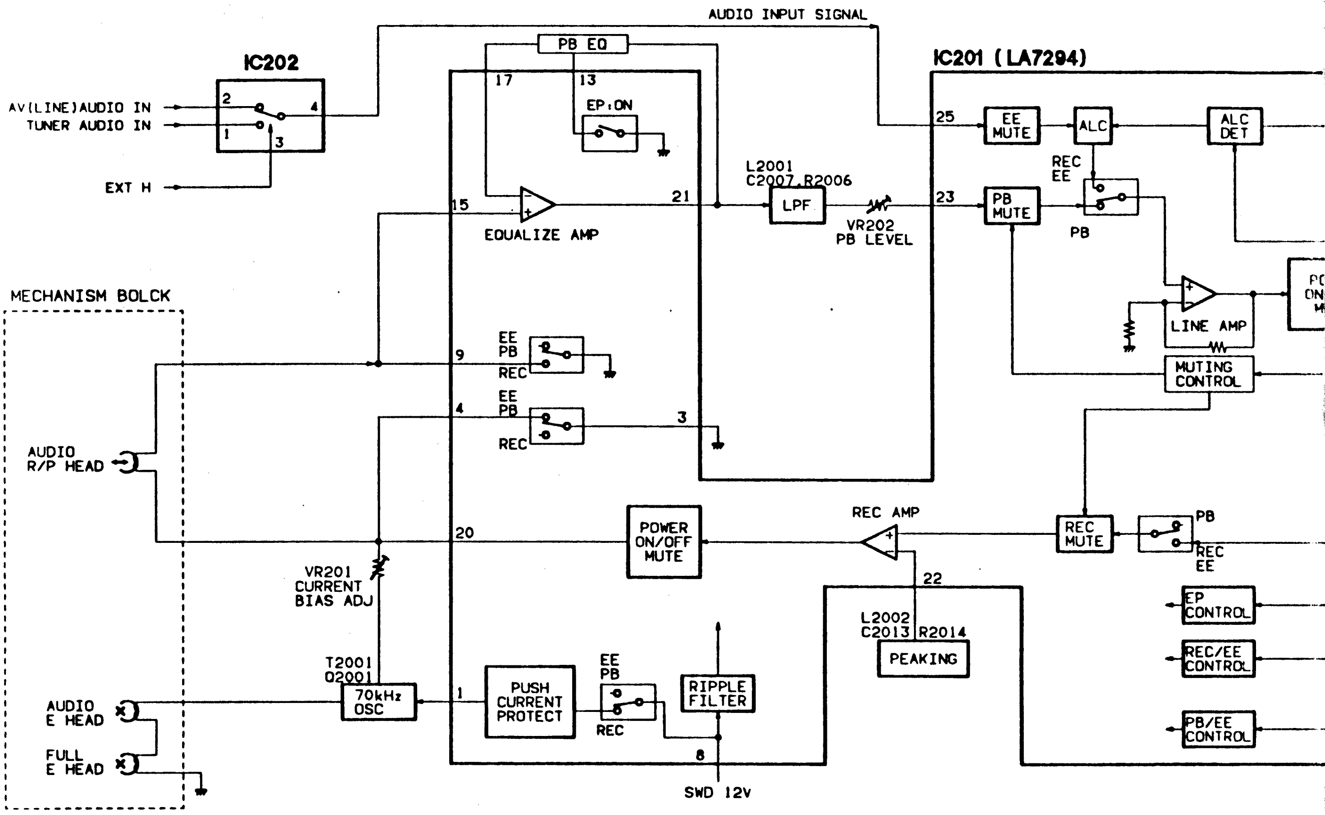
A


IC352
24 N.C.
23
22
21
20
18 N.C.
17 N.C.
16
15 N.C.
14
13
D/A CONVERT LPF
D/A CONVERT LPF
D/A CONVERT LPF
D/A CONVERT LPF
FG-1 AMP
26
25
CAPSTAN DRIVE
20
19
21
D3504
HEAD DRIVE
17
18
16
D-FG AMP
27
28
D-PG AMP
30
29
STILL+SLOW 13
REC CTL IN 12
REMARK 11
CTL PB OUT 15
THRESH HOLD SEL
SW LOGIC
TRAP
REC AMP
STL SHAPE
AGC DET
AGC AMP
4
7
8
MC-F/R OUT
C-FGI IN
MC-VS OUT
MH-VS OUT
D-FG IN
D-PG IN
CTL CHECK
CTL ⊕
CTL ⊖
HEAD
VR851
V-LOCK VR
24
25
26
27
28
29
30
31

Ⓐ
**VHR-4100EX**
**VHR-4100EV**
**VHR-4100G**

B

# AUDIO CIRCUIT BASIC BLOCK DIAGRAM

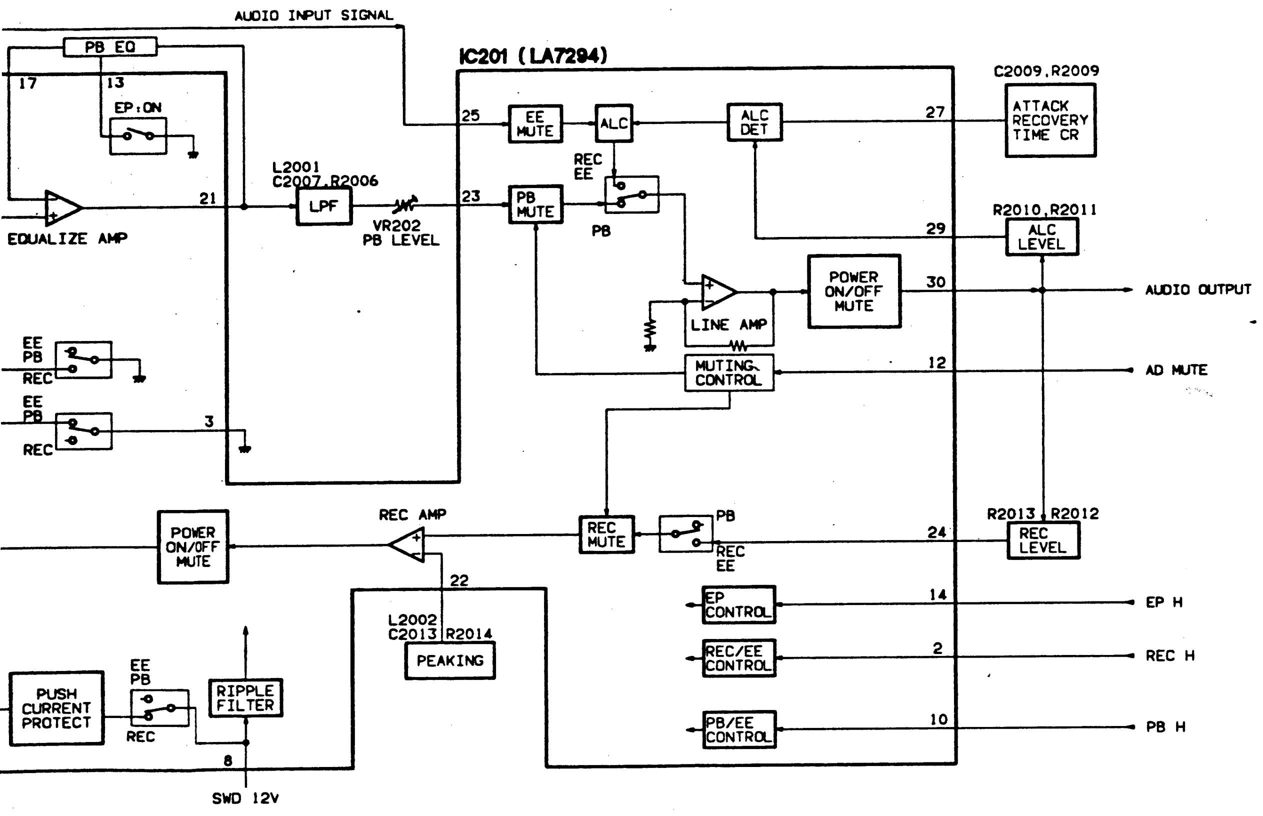

AUDIO INPUT SIGNAL
IC202
AV(LINE)AUDIO IN
TUNER AUDIO IN
EXT H
2
1
4
3
PB EQ
17
13
EP:ON
IC201 (LA7294)
25
EE MUTE
ALC
ALC DET
REC
EE
PB
L2001
C2007,R2006
LPF
21
23
15
EQUALIZE AMP
VR202
PB LEVEL
PB MUTE
LINE AMP
MUTING CONTROL
MECHANISM BOLCK
9
EE
PB
REC
4
3
AUDIO
R/P HEAD
20
POWER ON/OFF MUTE
REC AMP
REC MUTE
22
VR201
CURRENT
BIAS ADJ
L2002
C2013
R2014
PEAKING
EP CONTROL
REC/EE CONTROL
PB/EE CONTROL
T2001
Q2001
70kHz OSC
1
PUSH CURRENT PROTECT
RIPPLE FILTER
8
SWD 12V
AUDIO
E HEAD
FULL
E HEAD

Ⓑ
**VHR-4100EX**
**VHR-4100EV**
**VHR-4100G**

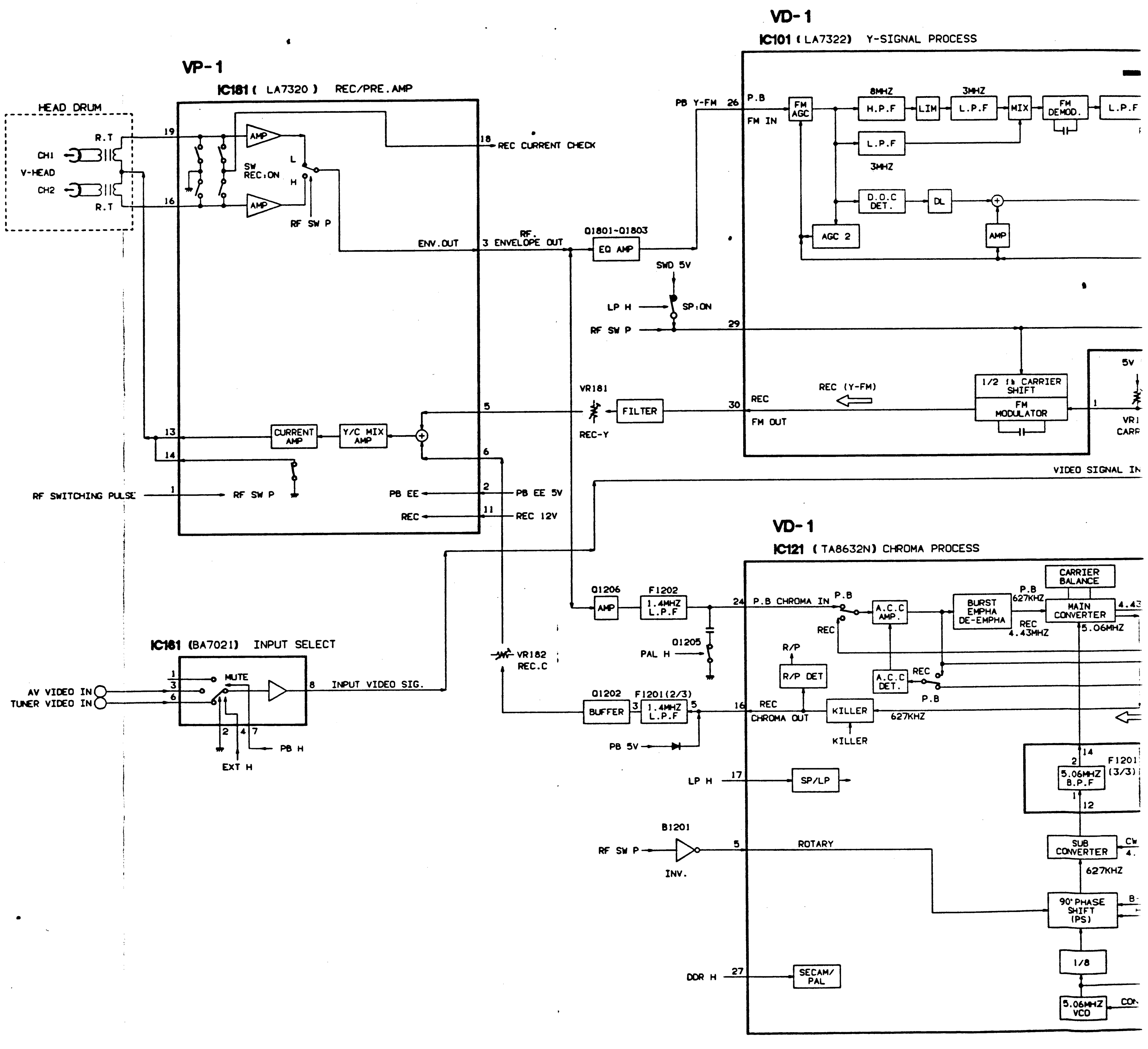
B

## VIDEO CIRC

## AUDIO CIRCUIT BASIC BLOCK DIAGRAM



AUDIO INPUT SIGNAL
PB EQ
17
13
EP:ON
EQUALIZE AMP
21
L2001
C2007,R2006
LPF
VR202
PB LEVEL
IC201 (LA7294)
25
EE MUTE
ALC
ALC DET
27
C2009,R2009
ATTACK RECOVERY TIME CR
REC EE
23
PB MUTE
PB
29
R2010,R2011
ALC LEVEL
LINE AMP
POWER ON/OFF MUTE
30
AUDIO OUTPUT
EE PB REC
MUTING CONTROL
12
AD MUTE
EE PB REC
3
POWER ON/OFF MUTE
REC AMP
REC MUTE
PB
REC EE
24
R2013
R2012
REC LEVEL
22
L2002
C2013
R2014
PEAKING
EP CONTROL
14
EP H
REC/EE CONTROL
2
REC H
PUSH CURRENT PROTECT
EE PB
REC
RIPPLE FILTER
PB/EE CONTROL
10
PB H
8
SWD 12V

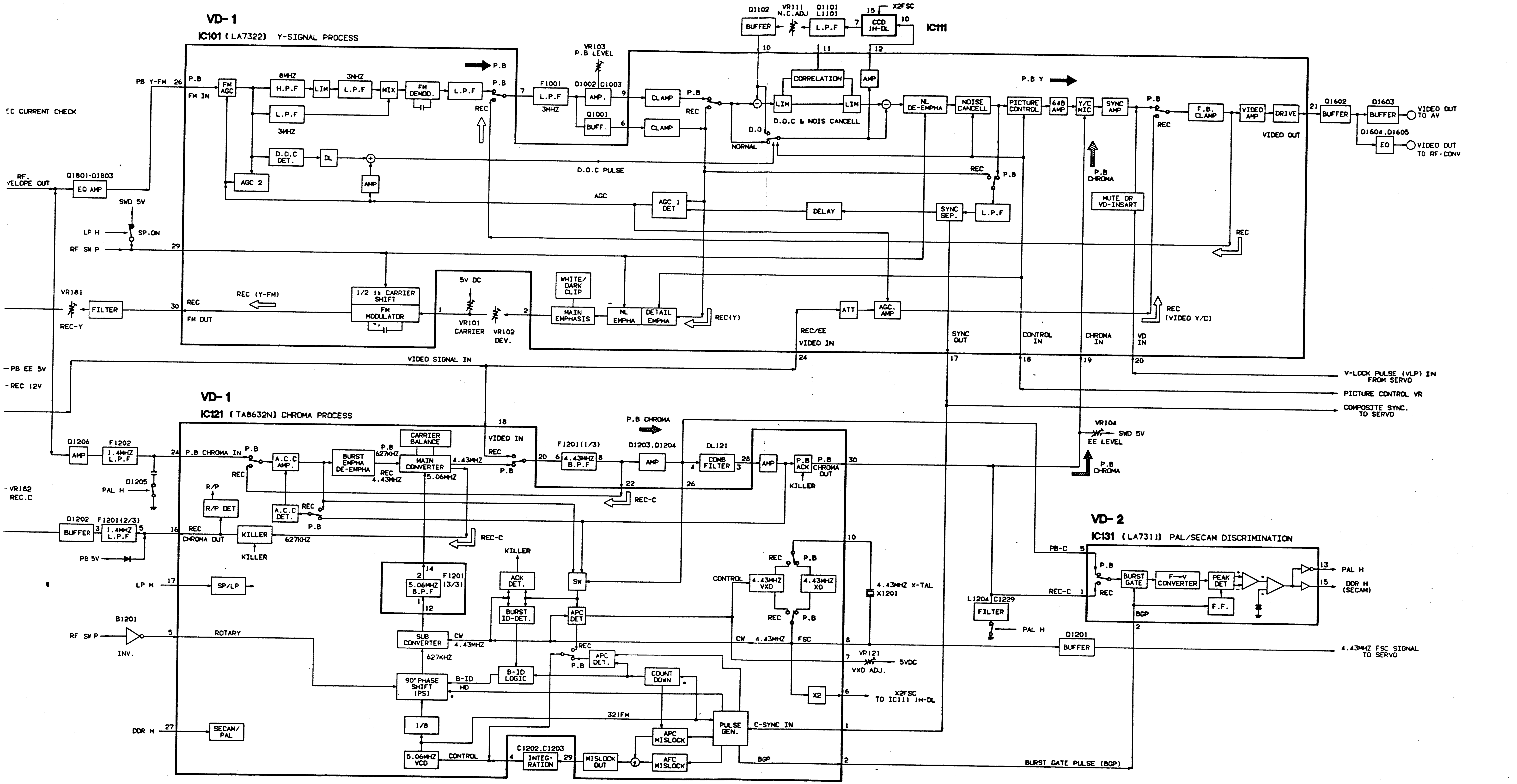


VP-1
IC181 ( LA7320 ) REC/PRE.AMP
HEAD DRUM
CH1
V-HEAD
CH2
R.T
R.T
19
16
AMP
AMP
SW REC:ON
L
H
RF SW P
18
REC CURRENT CHECK
ENV.OUT
RF.
3 ENVELOPE OUT
Q1801-Q1803
EQ AMP
SWD 5V
LP H
SP:ON
RF SW P
VR181
REC-Y
FILTER
5
13
14
CURRENT AMP
Y/C MIX AMP
6
RF SWITCHING PULSE
1
RF SW P
PB EE
2
PB EE 5V
REC
11
REC 12V
IC161 (BA7021) INPUT SELECT
AV VIDEO IN
TUNER VIDEO IN
1
3
6
MUTE
8
INPUT VIDEO SIG.
2
4
7
PB H
EXT H
VR182
REC.C
VD-1
IC101 ( LA7322) Y-SIGNAL PROCESS
PB Y-FM
26
P.B
FM IN
FM AGC
8MHZ
H.P.F
LIM
3MHZ
L.P.F
MIX
FM DEMOD.
L.P.F
L.P.F
3MHZ
D.O.C DET.
DL
AGC 2
AMP
29
30
REC
FM OUT
REC (Y-FM)
1/2 fH CARRIER SHIFT
FM MODULATOR
1
5V
VR1
CARR
VIDEO SIGNAL IN
VD-1
IC121 ( TA8632N) CHROMA PROCESS
Q1206
AMP
F1202
1.4MHZ L.P.F
24
P.B CHROMA IN
P.B
REC
A.C.C AMP.
BURST EMPHA DE-EMPHA
P.B 627KHZ
CARRIER BALANCE
MAIN CONVERTER
4.43
REC 4.43MHZ
5.06MHZ
Q1205
PAL H
R/P
R/P DET
A.C.C DET.
REC
P.B
Q1202
BUFFER
F1201(2/3)
3
1.4MHZ L.P.F
5
16
REC
CHROMA OUT
KILLER
627KHZ
KILLER
PB 5V
LP H
17
SP/LP
14
2
5.06MHZ B.P.F
1
12
F1201 (3/3)
B1201
RF SW P
5
INV.
ROTARY
SUB CONVERTER
627KHZ
90° PHASE SHIFT (PS)
1/8
5.06MHZ VCO
DDR H
27
SECAM/ PAL

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

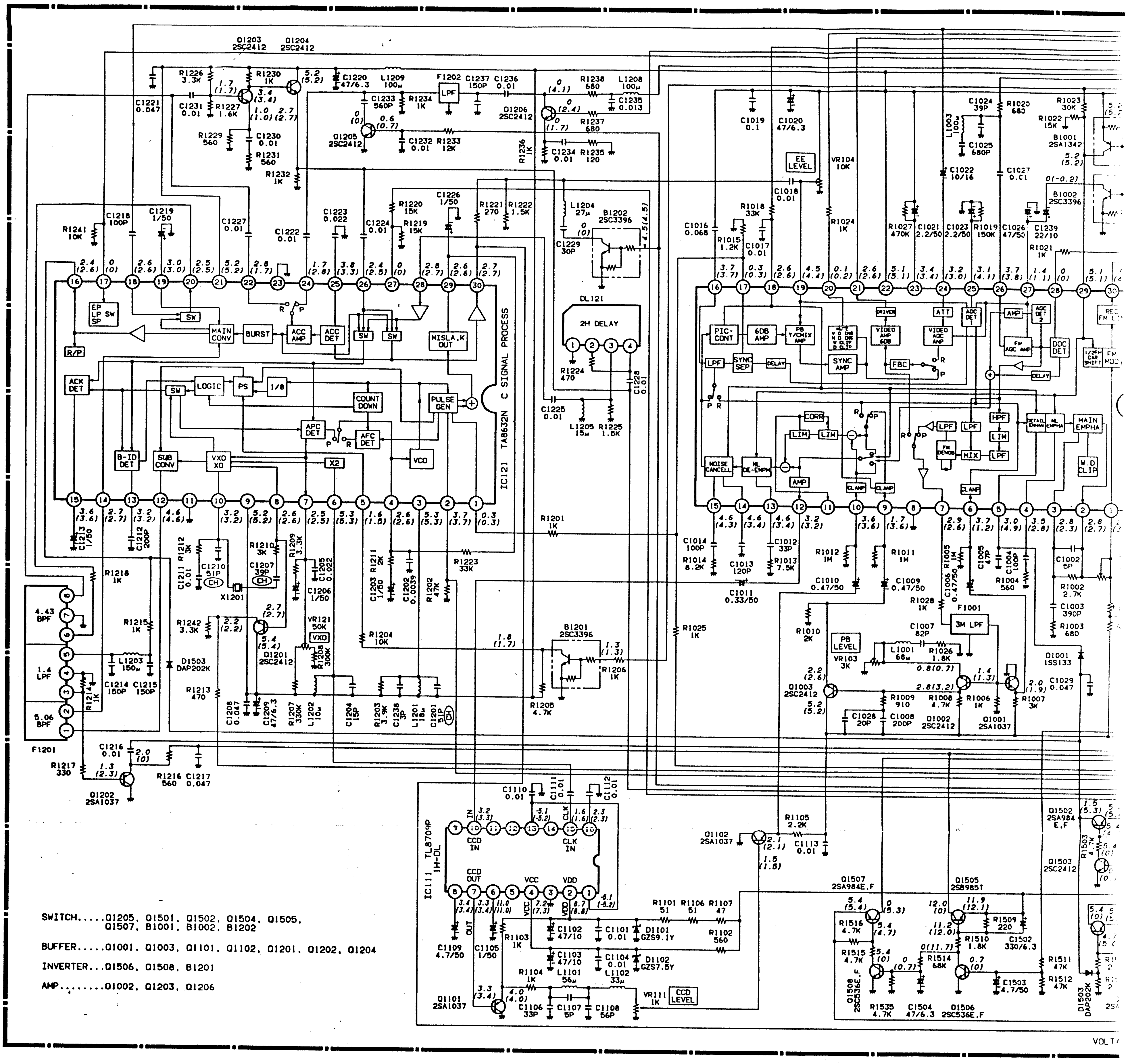
# VIDEO CIRCUIT BASIC BLOCK DIAGRAM

3


VD-1
IC101 (LA7322) Y-SIGNAL PROCESS
PB Y-FM
P.B
FM IN
FM AGC
8MHZ
H.P.F
LIM
3MHZ
L.P.F
MIX
FM DEMOD.
L.P.F
P.B
REC
3MHZ
D.O.C DET.
DL
AMP
AGC 2
EC CURRENT CHECK
RF. ENVELOPE OUT
Q1801-Q1803
EQ AMP
SWD 5V
LP H
SP:ON
RF SW P
VR181
FILTER
REC-Y
REC
FM OUT
REC (Y-FM)
1/2 fh CARRIER SHIFT
FM MODULATOR
5V DC
VR101 CARRIER
VR102 DEV.
WHITE/ DARK CLIP
MAIN EMPHASIS
NL EMPHA
DETAIL EMPHA
REC(Y)
F1001
L.P.F
3MHZ
VR103 P.B LEVEL
Q1002 Q1003
AMP.
Q1001
BUFF.
CLAMP
CLAMP
D.O.C PULSE
AGC
AGC 1 DET
DELAY
Q1102
BUFFER
VR111 N.C.ADJ
Q1101 L1101
L.P.F
X2FSC
CCD 1H-DL
IC111
CORRELATION
AMP
LIM
LIM
D.O
NORMAL
D.O.C & NOIS CANCELL
NL DE-EMPHA
NOISE CANCELL
PICTURE CONTROL
6dB AMP
Y/C MIC
SYNC AMP
P.B Y
F.B. CLAMP
VIDEO AMP
DRIVE
VIDEO OUT
P.B CHROMA
MUTE OR VD-INSART
SYNC SEP.
L.P.F
ATT
AGC. AMP
REC (VIDEO Y/C)
REC/EE VIDEO IN
SYNC OUT
CONTROL IN
CHROMA IN
VD IN
Q1602
BUFFER
Q1603
BUFFER
VIDEO OUT TO AV
Q1604,Q1605
EQ
VIDEO OUT TO RF-CONV
PB EE 5V
REC 12V
VIDEO SIGNAL IN
V-LOCK PULSE (VLP) IN FROM SERVO
PICTURE CONTROL VR
COMPOSITE SYNC. TO SERVO
VD-1
IC121 (TA8632N) CHROMA PROCESS
Q1206
AMP
F1202
1.4MHZ L.P.F
P.B CHROMA IN
A.C.C AMP.
BURST EMPHA DE-EMPHA
CARRIER BALANCE
MAIN CONVERTER
627KHZ
4.43MHZ
5.06MHZ
VIDEO IN
F1201(1/3)
4.43MHZ B.P.F
Q1203,Q1204
AMP
DL121
COMB FILTER
AMP
P.B ACK
P.B CHROMA OUT
KILLER
REC-C
Q1205
PAL H
VR182 REC.C
R/P
R/P DET
A.C.C DET.
Q1202
BUFFER
F1201(2/3)
1.4MHZ L.P.F
CHROMA OUT
KILLER
PB 5V
LP H
SP/LP
B1201
RF SW P
INV.
ROTARY
DDR H
SECAM/ PAL
F1201 (3/3)
5.06MHZ B.P.F
SUB CONVERTER
CW
90° PHASE SHIFT (PS)
B-ID
HD
1/8
5.06MHZ VCO
CONTROL
C1202,C1203
INTEG-RATION
MISLOCK OUT
APC MISLOCK
AFC MISLOCK
ACK DET.
BURST ID-DET.
B-ID LOGIC
SW
APC DET
APC DET.
COUNT DOWN
321FH
PULSE GEN.
C-SYNC IN
BGP
4.43MHZ VXO
4.43MHZ XO
4.43MHZ X-TAL X1201
FSC
VR121
VXO ADJ.
5VDC
X2
X2FSC TO IC111 1H-DL
VR104
SWD 5V
EE LEVEL
VD-2
IC131 (LA7311) PAL/SECAM DISCRIMINATION
PB-C
REC-C
BURST GATE
F→V CONVERTER
PEAK DET
F.F.
PAL H
DDR H (SECAM)
L1204 C1229
FILTER
Q1201
BUFFER
4.43MHZ FSC SIGNAL TO SERVO
BURST GATE PULSE (BGP)

16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

# COMPL. VD-1 VIDEO CIRCUIT (1AC-0-B11A-00800)


IC121 TA8632N C SIGNAL PROCESS
IC111 TL870HP 1H-DL
DL121 2H DELAY
F1201
4.43 BPF
1.4 LPF
5.06 BPF
MAIN CONV
BURST
ACC AMP
ACC DET
MISLA,K OUT
ACK DET
LOGIC
PS
1/8
COUNT DOWN
PULSE GEN
APC DET
AFC DET
VCO
B-ID DET
SUB CONV
VXO XO
X2
EP LP SW SP
R/P
PIC-CONT
6DB AMP
PB Y/CMIX AMP
SYNC SEP
SYNC AMP
VIDEO AGC AMP
ATT
AGC DET
DOC DET
NOISE CANCELL
NL DE-EMPH
MAIN EMPHA
W.D CLIP
3M LPF
EE LEVEL
PB LEVEL
CCD LEVEL
VOLT

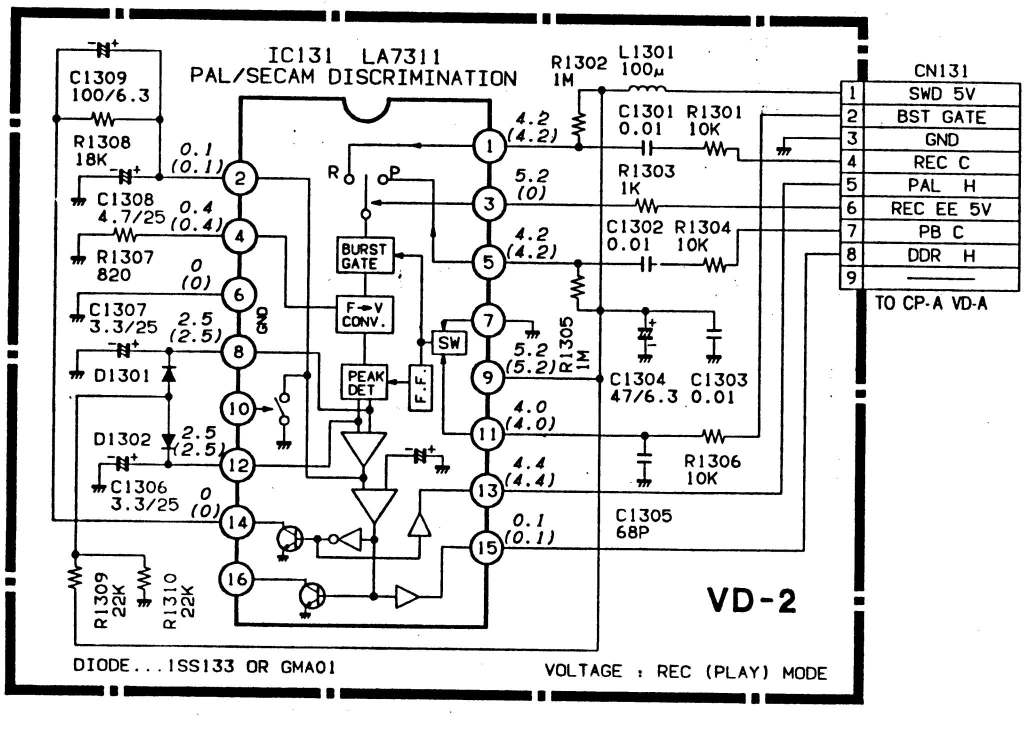
SWITCH.....Q1205, Q1501, Q1502, Q1504, Q1505, Q1507, B1001, B1002, B1202

BUFFER.....Q1001, Q1003, Q1101, Q1102, Q1201, Q1202, Q1204

INVERTER...Q1506, Q1508, B1201

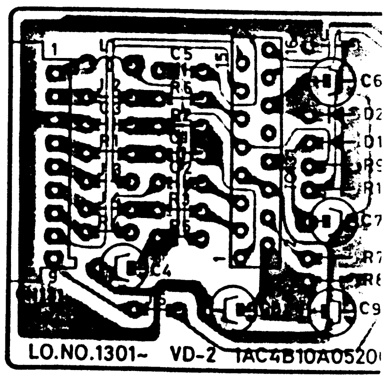
AMP.........Q1002, Q1203, Q1206

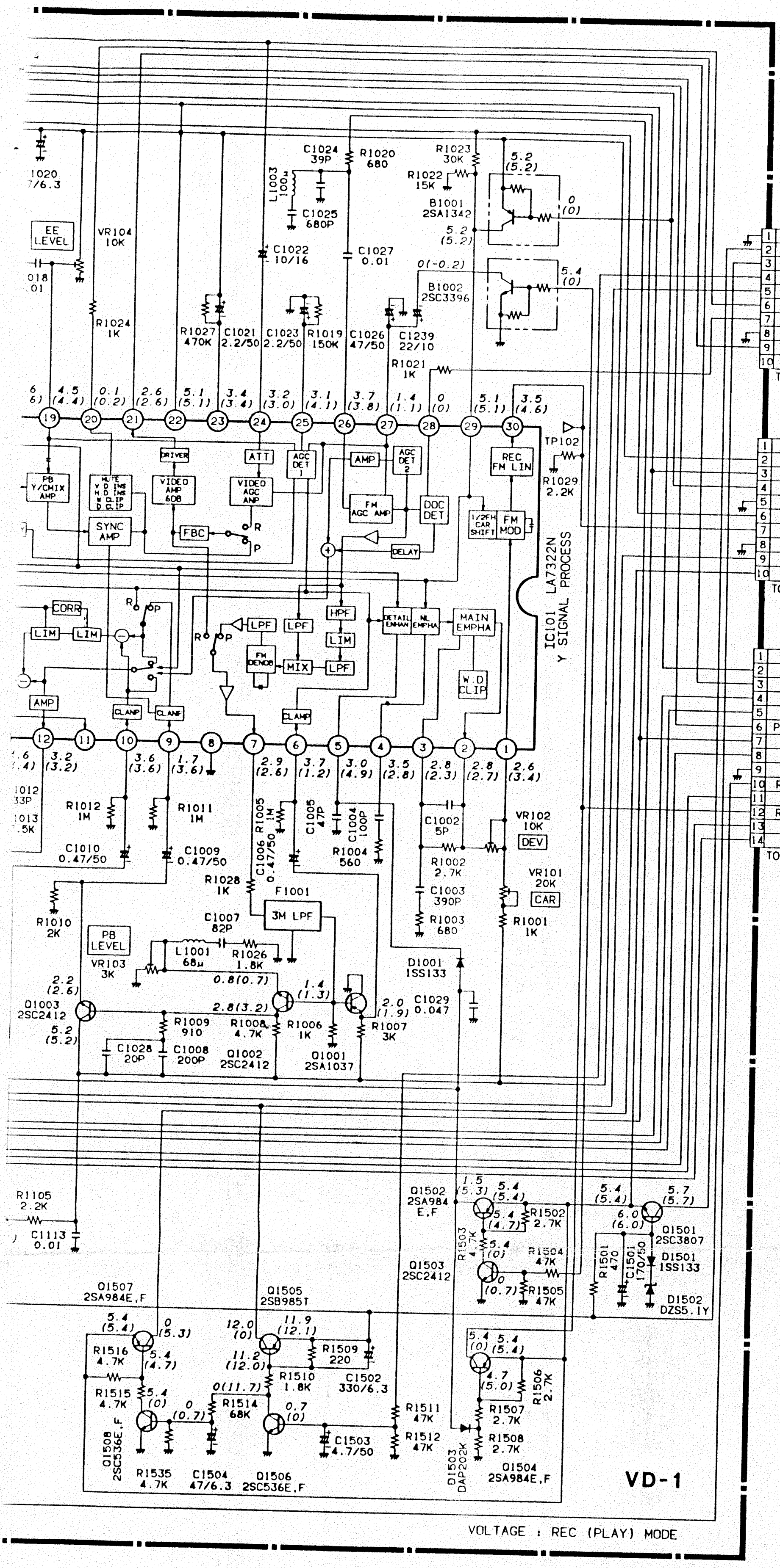
# COMPL. VD-2 VIDEO CIRCUIT & P.C.B. (1AC-0-B10A-05200)

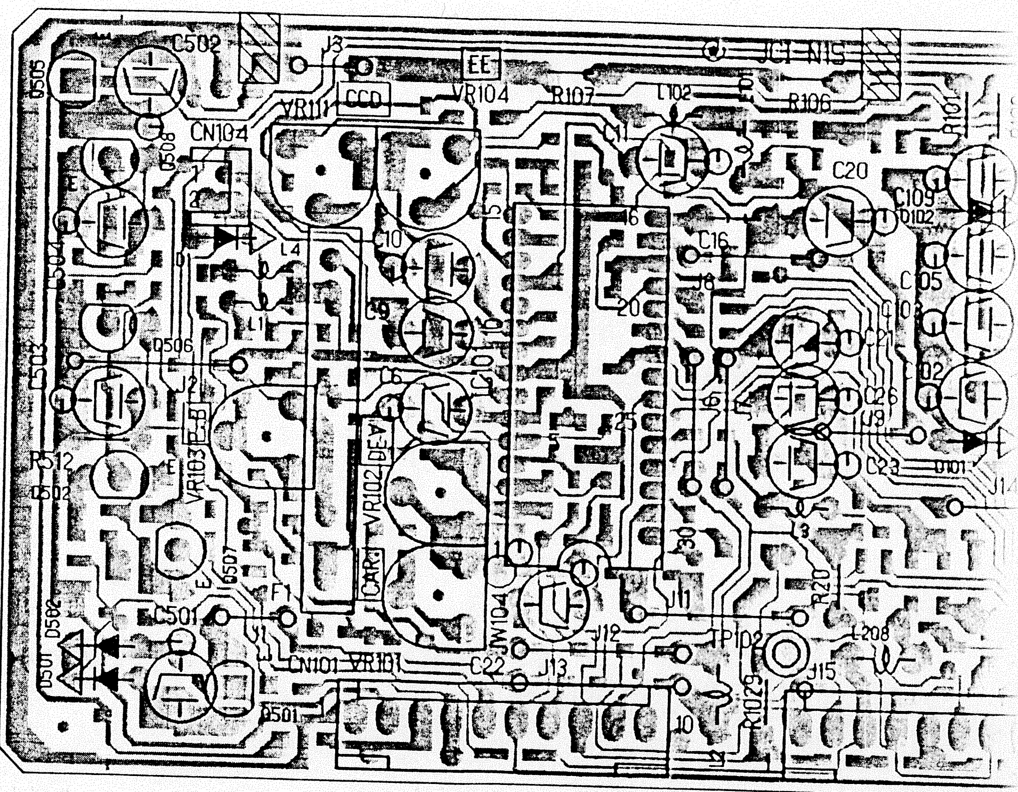

IC131 LA7311
PAL/SECAM DISCRIMINATION
BURST GATE
F→V CONV.
SW
PEAK DET
F.F.
CN131
1 SWD 5V
2 BST GATE
3 GND
4 REC C
5 PAL H
6 REC EE 5V
7 PB C
8 DDR H
9
TO CP-A VD-A
VD-2

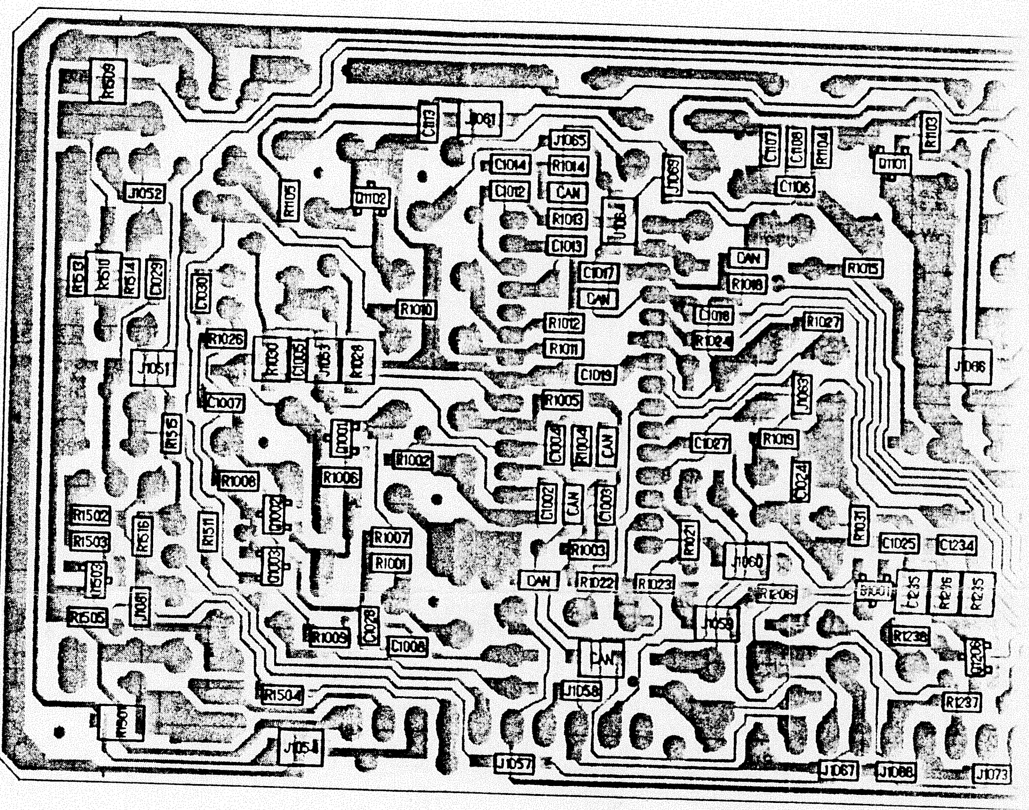
DIODE...1SS133 OR GMA01

VOLTAGE : REC (PLAY) MODE

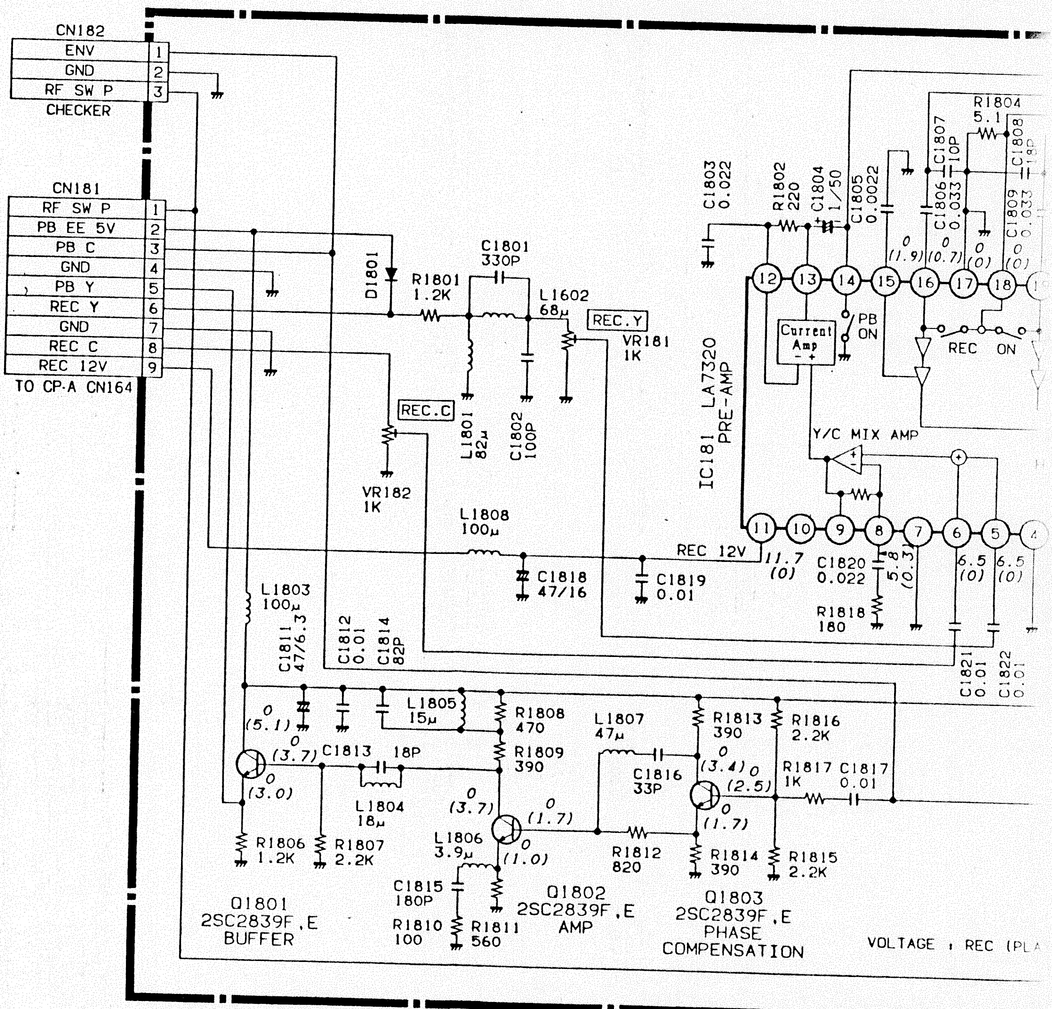

LO.NO.1301~ VD-2 1AC4B10A0520

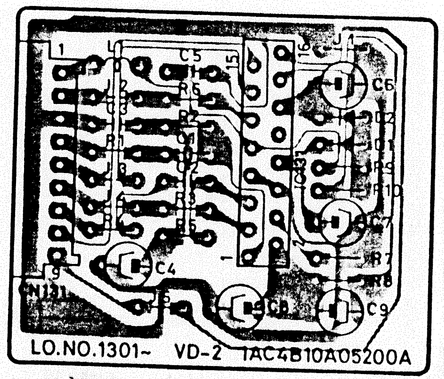

CN101
1 GND
2 ALWAYS 5.8V
3 SWD 12V
4 PB H
5 REC H
6 VD IN
7 DOP
8 GND
9 VD OUT
10
TO CP-A VD-A
CN102
1 RF SW P
2 PB EE 5V
3 PB C
4 GND
5 PB Y
6 REC Y
7 GND
8 REC C
9 REC 12V
TO CP-A VD-A
CN103
1 LP H
2 VLP
3 C SYNC
4 FSC
5 PICTURE VR
6 SWD 5V
7 BST GATE
8 GND
9 REC C OUT
10 PAL H
11 REC EE 5V
12 PB C
13 DDR H
14
TO CP-A VD-A
IC101 LA7322N Y SIGNAL PROCESS
EE LEVEL
PB LEVEL
VR104 10K
VR103 3K
VR102 10K DEV
VR101 20K CAR
F1001 3M LPF
B1001 2SA1342
B1002 2SC3396
Q1001 2SA1037
Q1002 2SC2412
Q1003 2SC2412
D1001 1SS133
Q1501 2SC3807
Q1502 2SA984 E,F
Q1503 2SC2412
Q1504 2SA984E,F
Q1505 2SB985T
Q1506 2SC536E,F
Q1507 2SA984E,F
Q1508 2SC536E,F
D1501 1SS133
D1502 DZS5.1Y
D1503 DAP202K
SYNC AMP
FBC
VIDEO AGC AMP
VIDEO AMP 6DB
AGC DET
FM AGC AMP
DOC DET
REC FM LIN
FM MOD
DELAY
DETAIL ENHAN
NL EMPHA
MAIN EMPHA
W D CLIP
CLAMP
LPF
HPF
LIM
MIX
CORR
AMP
TP102
VD-1
VOLTAGE : REC (PLAY) MODE


C502
J3
EE
JC1 N15
VR104
R107
L102
R106
R101
CN104
VR111
CCD
C20
C109
D102
C16
C105
C10
C9
D506
C26
VR103
VR102 DEV
C23
D101
D502
CAR
D501
C501
CN101 VR101
C22
J13
J12
TP102
J15
R1029
D505
D508
D503
D504
L4
C501


R1509
J1061
J1065
C1014
R1014
C1012
CAN
R1013
C1013
C1107
C1108
R1104
R1103
D1101
C1106
J1052
R1105
D1102
R1510
R1514
D1029
C1030
C1017
R1015
R1016
R1010
R1012
R1011
C1019
R1026
R1027
J1051
C1007
R1002
R1005
R1006
R1008
C1027
R1019
R1516
R1511
R1503
R1007
R1001
R1003
R1022
R1023
R1021
C1025
C1234
R1505
R1009
C1008
R1504
J1058
J1060
R1237
J1057
J1067
J1088
J1173
R1236
J1068

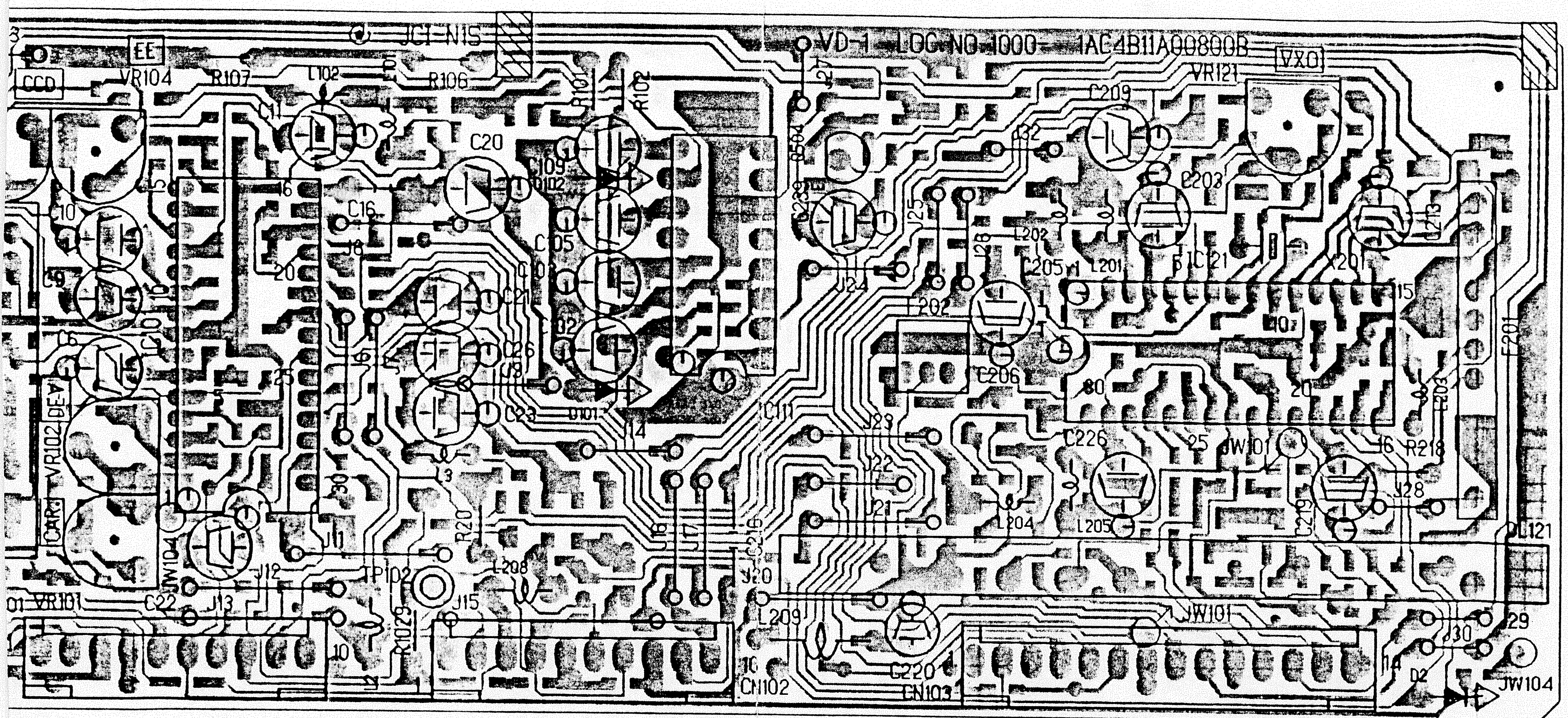
## COMPL. VP-1 VIDEO PRE-AMP CIRCUIT (1AC-0-B10A


CN182
ENV
GND
RF SW P
CHECKER
CN181
RF SW P
PB EE 5V
PB C
GND
PB Y
REC Y
GND
REC C
REC 12V
TO CP-A CN164
D1801
R1801 1.2K
C1801 330P
L1602 68μ
REC.Y
VR181 1K
REC.C
VR182 1K
L1801 82μ
C1802 100P
L1808 100μ
C1818 47/16
C1819 0.01
REC 12V
IC181 LA7320 PRE-AMP
Current Amp
PB ON
REC ON
Y/C MIX AMP
R1802 220
C1803 0.022
C1804 1/50
C1805 0.0022
C1806 0.033
C1807 10P
R1804 5.1
C1808
C1809
C1820 0.022
R1818 180
C1821 0.01
C1822 0.01
L1803 100μ
C1811 47/6.3
C1812 0.01
C1814 82P
L1805 15μ
R1808 470
R1809 390
C1813 18P
L1804 18μ
L1806 3.9μ
C1815 180P
R1810 100
R1811 560
L1807 47μ
C1816 33P
R1812 820
R1813 390
R1814 390
R1815 2.2K
R1816 2.2K
R1817 1K
C1817 0.01
R1806 1.2K
R1807 2.2K
Q1801 2SC2839F,E BUFFER
Q1802 2SC2839F,E AMP
Q1803 2SC2839F,E PHASE COMPENSATION
VOLTAGE : REC (PLA

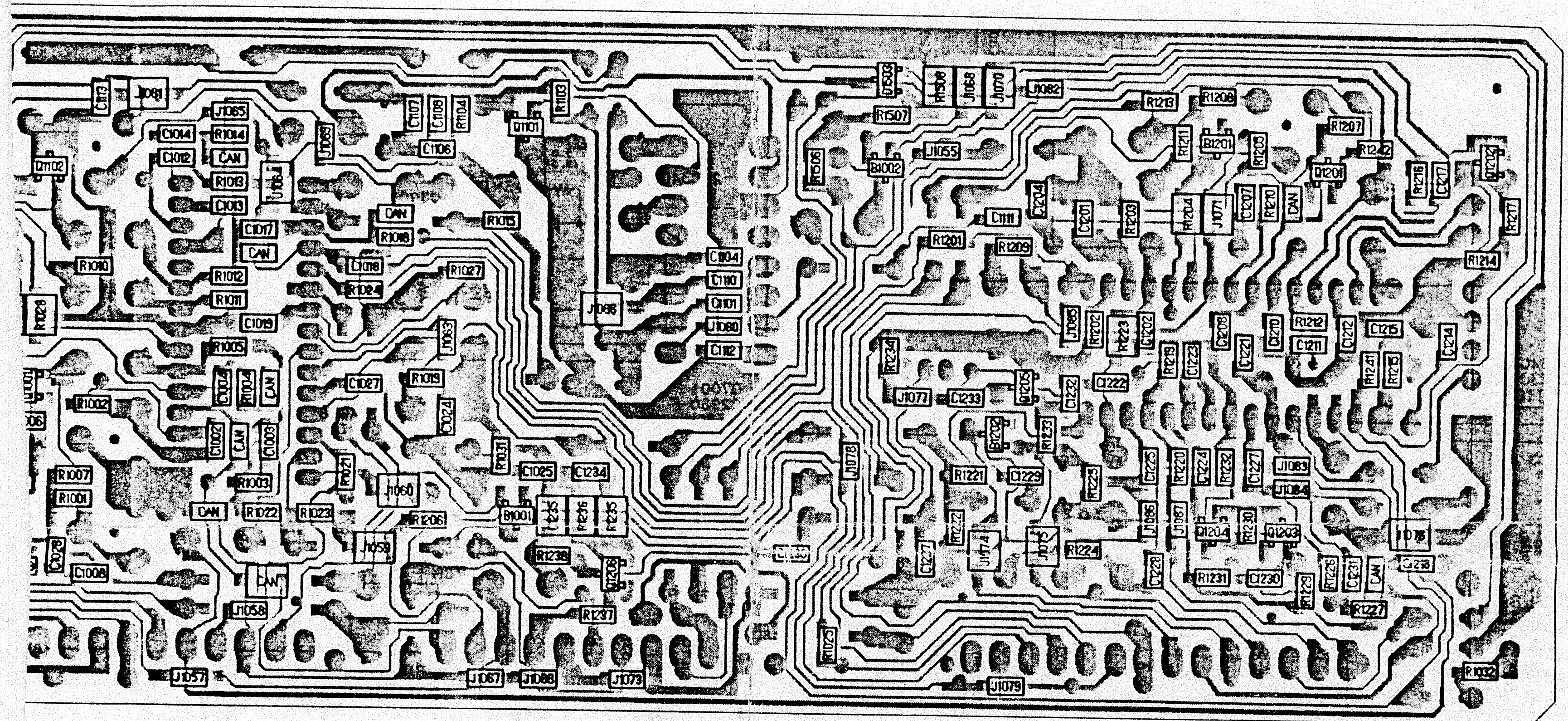

C5
C6
C4
C8
C9
R7
R8
CN131
LO.NO.1301~ VD-2 1AC4B10A05200A

8 9 10 11 12 13 14 15 16 17 18 19

## VD-1 VIDEO P.C.B.

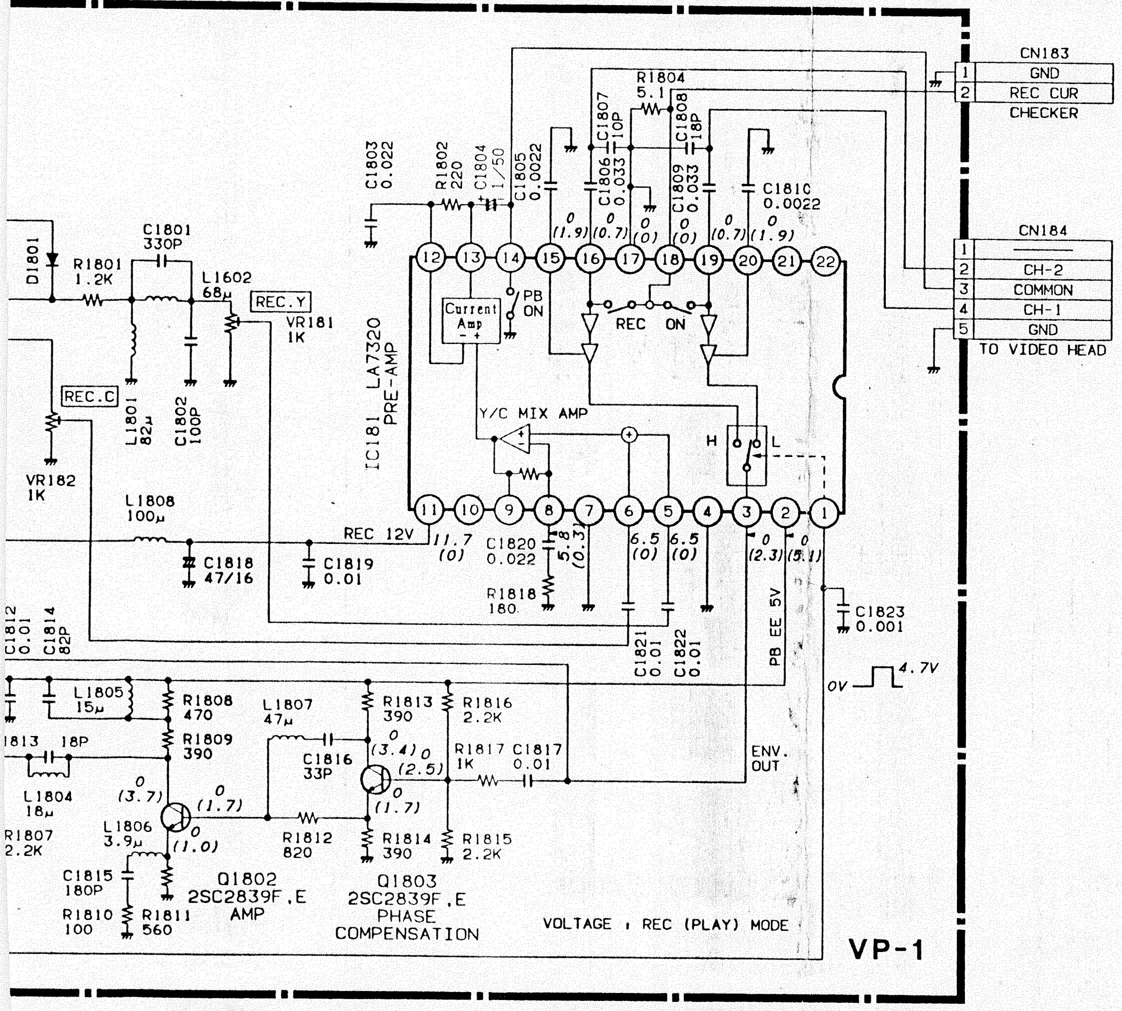


JCI-N15
VD-1 LOC NO.1000 1AC4B11A00800B
VXO
EE
CCD
VR104
R107
L102
R106
R101
R102
VR121
C209
C203
C20
C16
C105
C21
C26
C23
D101
L202
C205
L201
IC121
X201
C206
C226
JW101
R218
L204
L205
C219
IC111
TP102
L208
J15
L209
C220
CN102
CN103
JW101
J30
D2
JW104
VR102
VR101
C22
J13
J12
J11
F201
R203



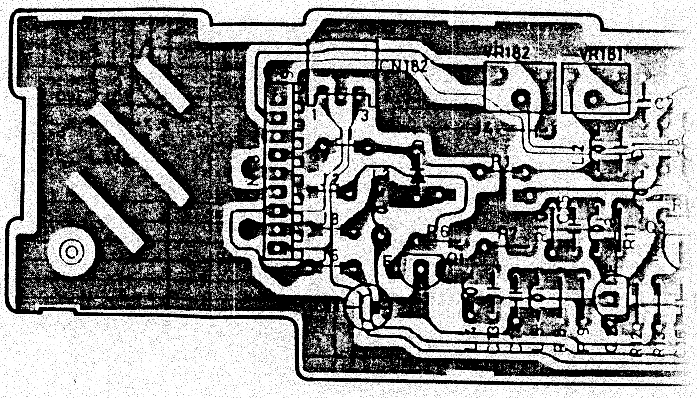
**CHIP PARTS**

## PL. VP-1 VIDEO PRE-AMP CIRCUIT (1AC-0-B10A-02200)



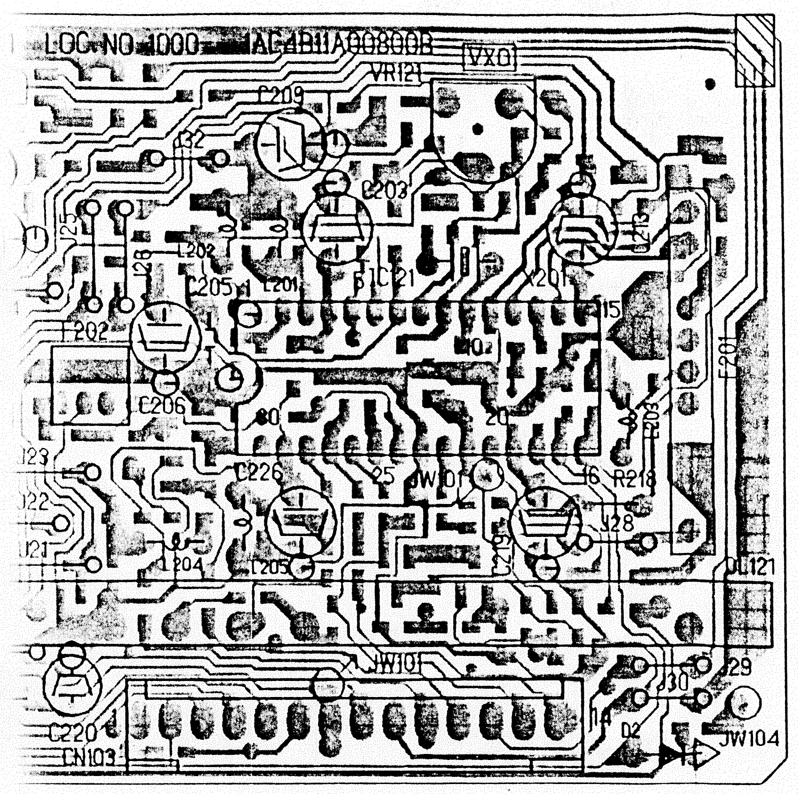
CN183
1 GND
2 REC CUR CHECKER
CN184
1
2 CH-2
3 COMMON
4 CH-1
5 GND
TO VIDEO HEAD
R1804 5.1
C1803 0.022
R1802 220
C1804 1/50
C1805 0.0022
C1806 0.033
C1807 10P
C1808 18P
C1809 0.033
C1810 0.0022
C1801 330P
D1801
R1801 1.2K
L1602 68μ
REC.Y
VR181 1K
REC.C
VR182 1K
L1801 82μ
C1802 100P
L1808 100μ
C1818 47/16
C1819 0.01
REC 12V
IC181 LA7320 PRE-AMP
Current Amp
PB ON
REC ON
Y/C MIX AMP
H L
C1820 0.022
R1818 180
C1821 0.01
C1822 0.01
PB EE 5V
C1823 0.001
0V 4.7V
C1812 0.01
C1814 82P
L1805 15μ
R1808 470
R1809 390
L1807 47μ
R1813 390
R1816 2.2K
C1816 33P
R1817 1K
C1817 0.01
ENV. OUT
1813 18P
L1804 18μ
L1806 3.9μ
R1807 2.2K
C1815 180P
R1810 100
R1811 560
R1812 820
R1814 390
R1815 2.2K
Q1802 2SC2839F,E AMP
Q1803 2SC2839F,E PHASE COMPENSATION
VOLTAGE : REC (PLAY) MODE
VP-1

VP-1 VID

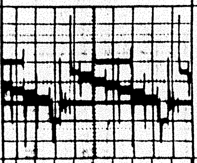
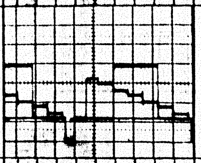
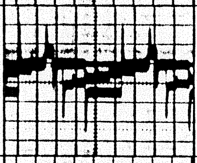
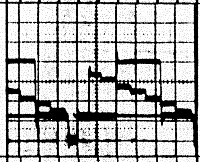
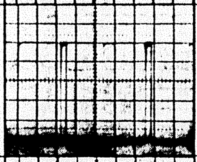
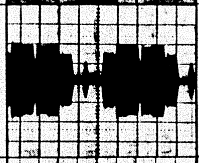
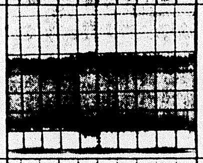
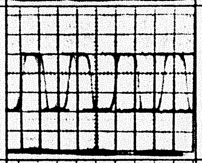
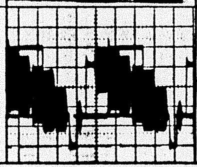


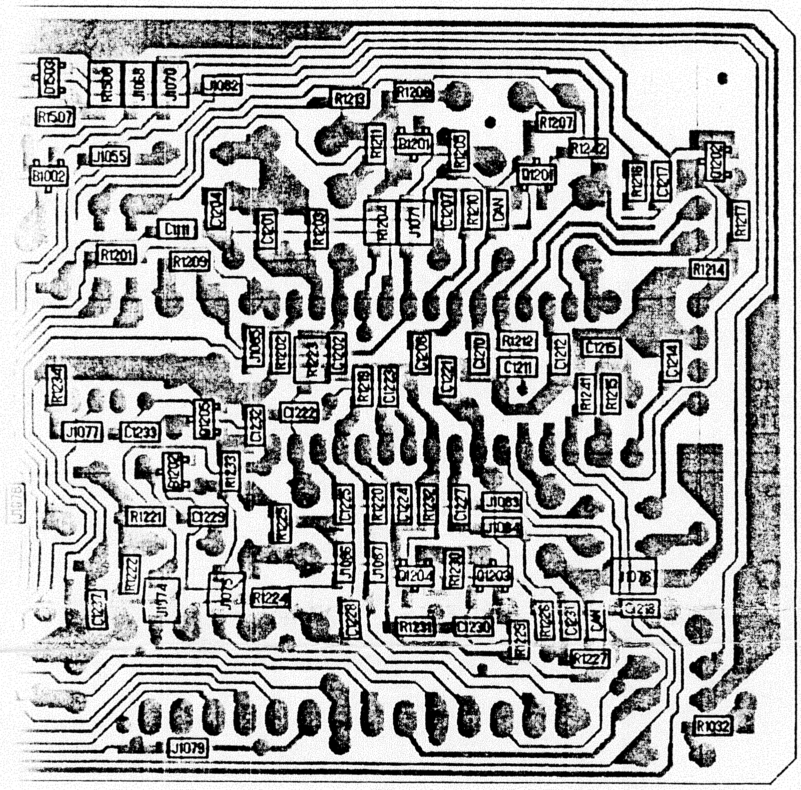
CN182
VR182
VR181

16 17 18 19 20 21 22 23 24 25 26

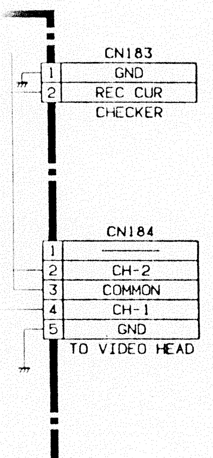

LOC NO 1000
AC4B11A00800B
VXO
VR121
C209
C203
C221
X201
L202
C205
L201
T202
C206
C226
JW101
R218
C220
CN103
IC121
JW104
D2

## WAVEFORM OF VIDEO

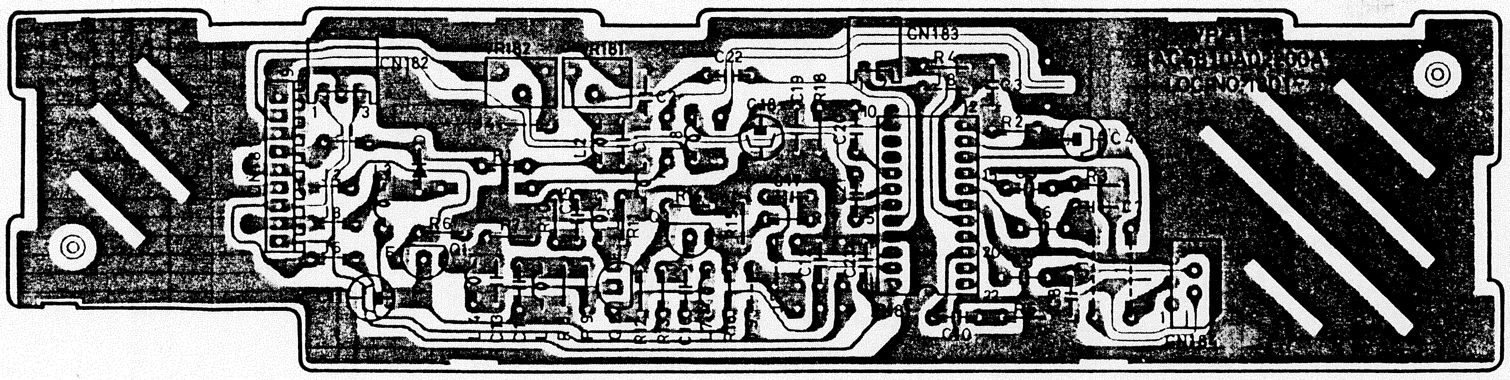
| Pin No. |  |  |
|---|---|---|
| IC101<br>(2) |  | REC<br>1.2 Vp-p<br>(200 mV/div) |
| (6) |  | REC<br>500 m Vp-p<br>(100 mV/div) |
| (6) |  | PLAY<br>300 m Vp-p<br>(100 mV/div) |
| (9) (10) |  | PLAY<br>500 m Vp-p<br>(100 mV/div) |
| (17) |  | 4 Vp-p<br>15.625 KHz<br>(1 V/div) |
| (18) |  | PLAY<br>320 m Vp-p<br>(100 mV/div) |
| (26) |  | PLAY<br>400 m Vp-p<br>(100 mV/div) |
| (30) |  | REC<br>1.5 Vp-p<br>(500 mV/div) |
| TP161<br>(CP-1) |  | PLAY<br>1 Vp-p<br>(200 mV/div) |


R1507
J1055
R1201
R1209
R1207
R1214
J1077
R1221
C1229
J1079
R1032
R1227

CHIP PARTS


CN183
1
GND
2
REC CUR
CHECKER
CN184
1
2
CH-2
3
COMMON
4
CH-1
5
GND
TO VIDEO HEAD
1

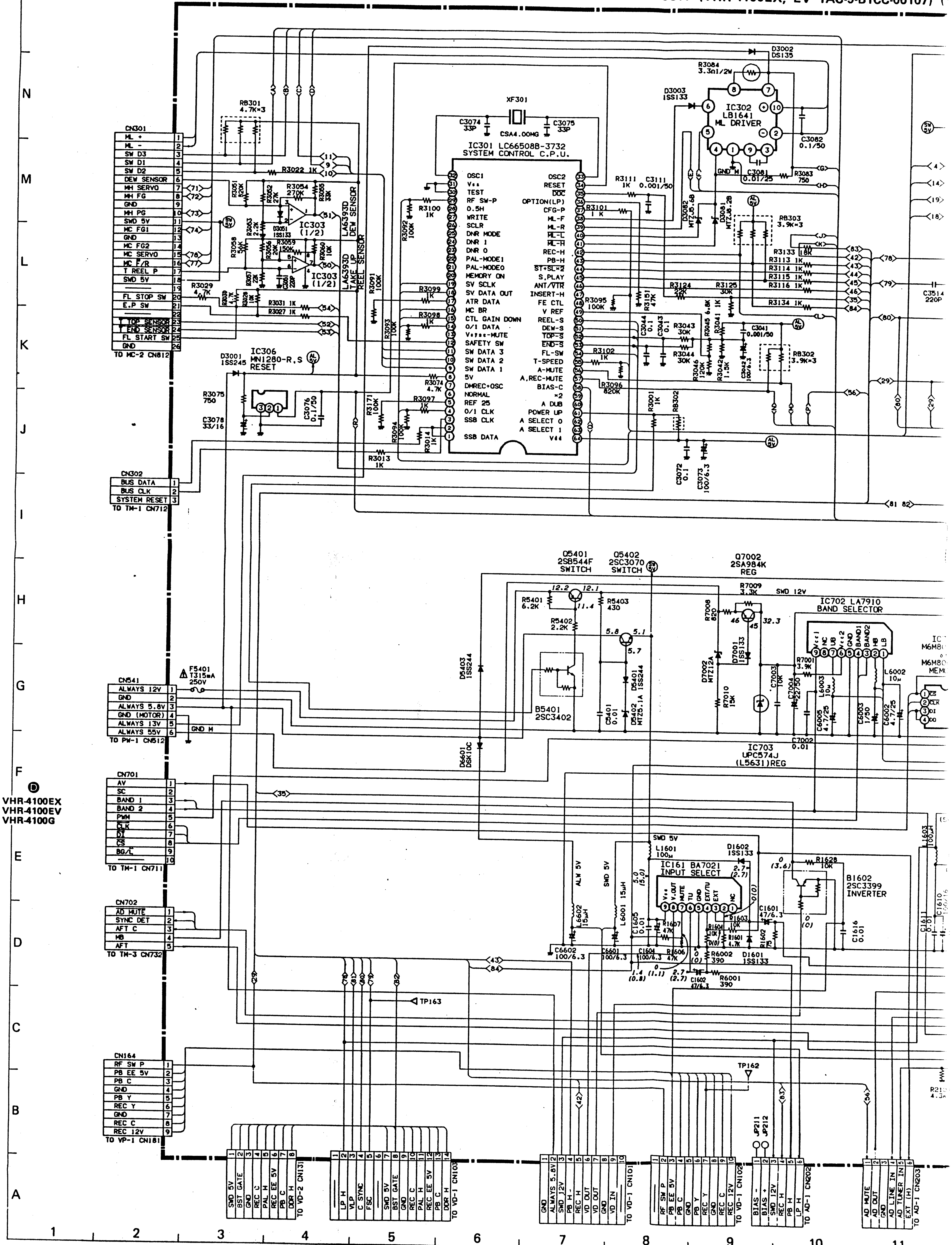
## VP-1 VIDEO PRE-AMP P.C.B.


CN182
R182
R181
CN183
VP-1
C22
C4
CN184

21 22 23 24 25 26 27 28 29 30 31

D

## COMPL. CP-A MAIN CIRCUIT (VHR-4100EX, EV 1AC-9-B1CC-00107) (

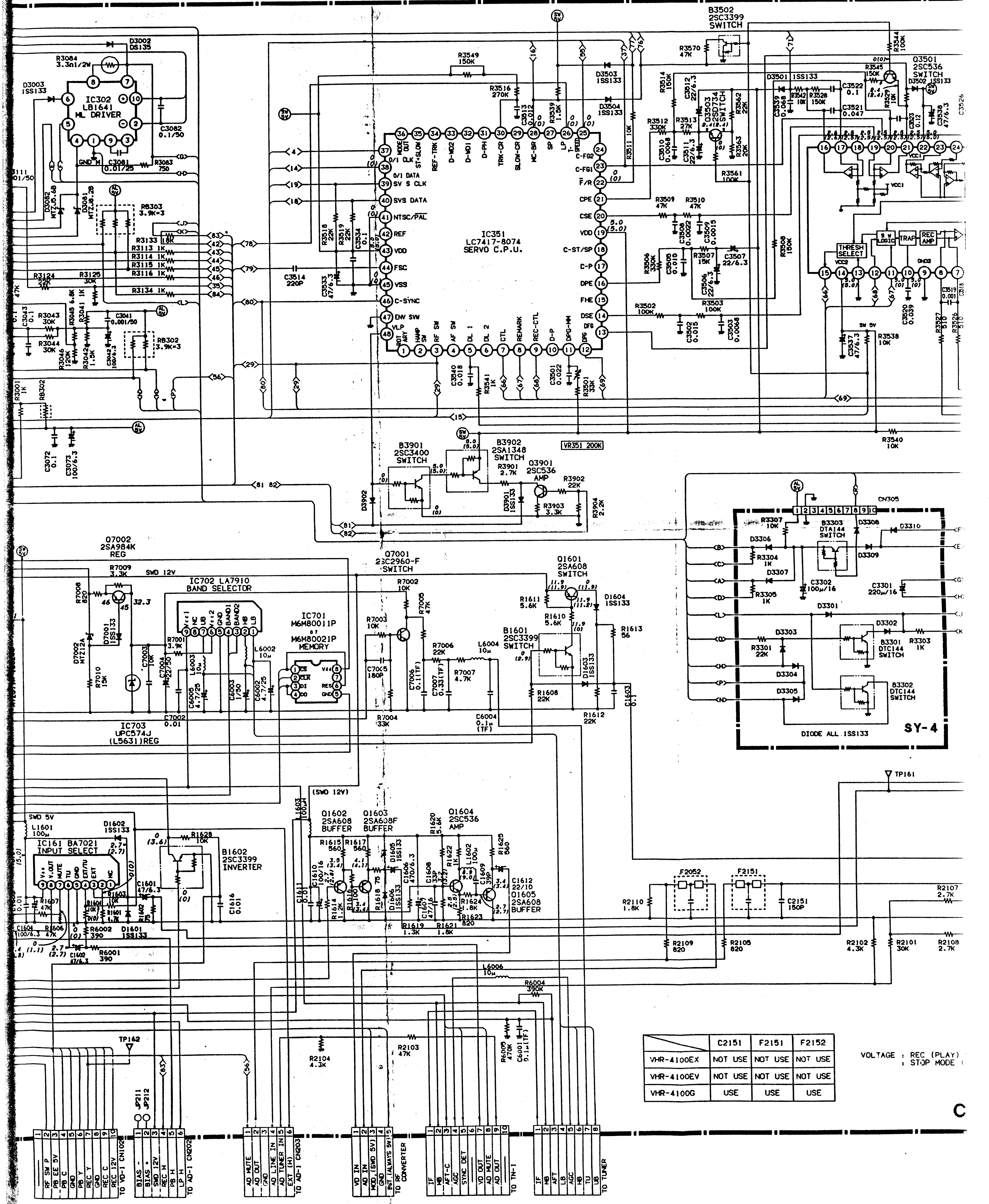


CN301
ML +
ML -
SW D3
SW D1
SW D2
DEW SENSOR
MH SERVO
MH FG
GND
MH PG
SWD 5V
MC FG1
GND
MC FG2
MC SERVO
MC F/R
T REEL P
SWD 5V
FL STOP SW
E.P SW
TOP SENSOR
END SENSOR
FL START SW
GND
TO MC-2 CN812
R8301 4.7K×3
IC303 (1/2)
IC303 (1/2)
LA6393D DEW SENSOR
LA6393D TAKE UP REEL SENSOR
IC306 MN1280-R,S RESET
D3001 1SS245
XF301
CSA4.00MG
C3074 33P
C3075 33P
IC301 LC66508B-3732 SYSTEM CONTROL C.P.U.
OSC1
TEST
RF SW-P
0.5H
WRITE
SCLR
DNR MODE
DNR 1
DNR 0
PAL-MODE1
PAL-MODE0
MEMORY ON
SV SCLK
SV DATA OUT
ATR DATA
MC BR
CTL GAIN DOWN
0/1 DATA
SAFETY SW
SW DATA 3
SW DATA 2
SW DATA 1
5V
DMREC+OSC
NORMAL
REF 25
0/1 CLK
SSB CLK
SSB DATA
OSC2
RESET
DOC
OPTION(LP)
CFG-P
ML-F
ML-R
REC-H
PB-H
ST+SL×2
S.PLAY
ANT/VTR
INSERT-H
FE CTL
V REF
REEL-S
DEW-S
TOP-S
END-S
FL-SW
T-SPEED
A-MUTE
A.REC-MUTE
BIAS-C
A DUB
POWER UP
A SELECT 0
A SELECT 1
IC302 LB1641 ML DRIVER
D3002 DS135
D3003 1SS133
R3084 3.3Ω1/2W
R8303 3.9K×3
R8302 3.9K×3
CN302
BUS DATA
BUS CLK
SYSTEM RESET
TO TM-1 CN712
Q5401 2SB544F SWITCH
Q5402 2SC3070 SWITCH
Q7002 2SA984K REG
B5401 2SC3402
IC702 LA7910 BAND SELECTOR
IC703 UPC574J (L5631)REG
CN541
ALWAYS 12V
GND
ALWAYS 5.8V
GND (MOTOR)
ALWAYS 13V
ALWAYS 55V
TO PW-1 CN512
F5401 T315mA 250V
CN701
AV
SC
BAND 1
BAND 2
PWM
CLK
DI
CS
BG/L
TO TM-1 CN711
CN702
AD MUTE
SYNC DET
AFT C
MB
AFT
TO TM-3 CN732
IC161 BA7021 INPUT SELECT
B1602 2SC3399 INVERTER
D1602 1SS133
D1601 1SS133
TP163
TP162
CN164
RF SW P
PB EE 5V
PB C
GND
PB Y
REC Y
GND
REC C
REC 12V
TO VP-1 CN181
SWD 5V
BST GATE
GND
REC C
PAL H
REC EE 5V
PB C
DDR H
TO VD-2 CN131
LP H
VLP
C SYNC
FSC
SWD 5V
BST GATE
GND
REC C
PAL H
REC EE 5V
PB C
DDR H
TO VD-1 CN103
GND
ALWAYS 5.8V
SWD 12V
PB H
REC H
VD OUT
VD OUT
GND
VD IN
TO VD-1 CN101
RF SW P
PB EE 5V
PB C
GND
PB Y
REC Y
GND
REC C
REC 12V
TO VD-1 CN102
JP211
JP212
BIAS -
BIAS +
SWD 12V
REC H
PB H
LP H
TO AD-1 CN202
AD MUTE
AD OUT
GND
AD LINE IN
AD TUNER IN
EXT (H)
TO AD-1 CN203

VHR-4100EX
VHR-4100EV
VHR-4100G

D

RCUIT (VHR-4100EX, EV 1AC-9-B1CC-00107) (VHR-4100G 1AC-9-B1CC-00100)

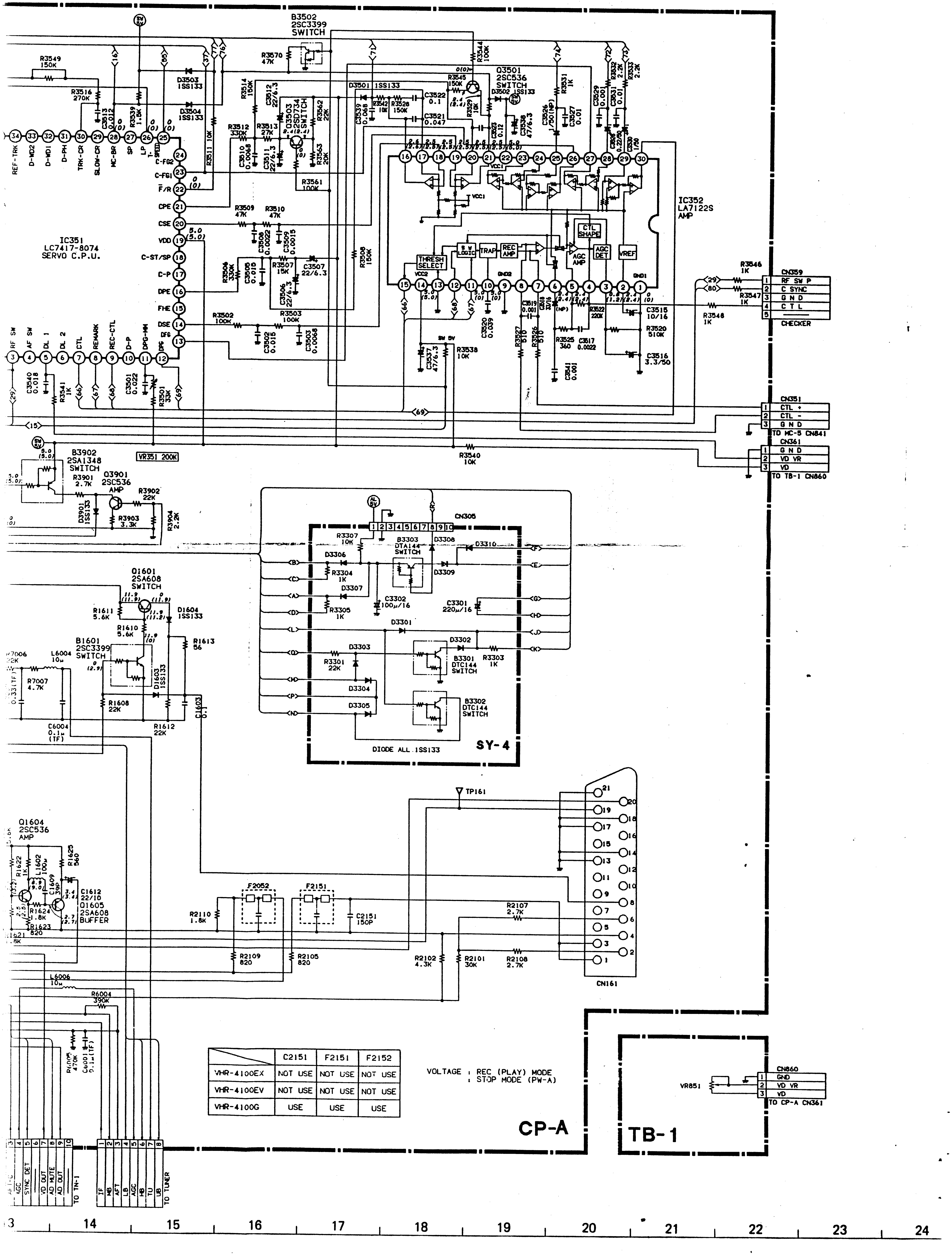

IC302 LB1641 ML DRIVER
D3002 DS135
R3084 3.3Ω1/2W
D3003 1SS133
C3082 0.1/50
C3081 0.01/25
R3083 750
D3082 MTZJ5.6B
D3081 MTZJ8.2B
RB303 3.9K×3
R3133 18K
R3113 1K
R3114 1K
R3115 1K
R3116 1K
R3124 22K
R3125 30K
R3134 1K
R3043 30K
R3044 30K
R3045 6.8K
R3041 1K
C3041 0.001/50
C3042 100/6.3
R3046 120K
R3042 1.5K
RB302 3.9K×3
R3001 1K
C3072 0.1
C3073 100/6.3
R3549 150K
R3516 270K
C3513 0.012
R3539 1.5K
D3503 1SS133
D3504 1SS133
R3511 10K
IC351 LC7417-8074 SERVO C.P.U.
MODE OUT
ST+SLOW
REF-TRK
D-MD2
D-MD1
D-PH
TRK-CR
SLOW-CR
MC-BR
SP
LP
T-SPEED
C-FG2
C-FG1
F/R
CPE
CSE
VDD
C-ST/SP
C-P
DPE
FHE
DSE
DFG
DPG-MM
D-P
REC-CTL
REMARK
CTL
DL 2
DL 1
AF SW
RF SW
HAMP SW
ROT ARY
VLP
ENV SW
C-SYNC
VSS
FSC
VDD
REF
NTSC/PAL
SVS DATA
SV S CLK
0/1 DATA
0/1 CLK
R3518 22K
R3519 22K
C3534 0.1
C3533 47/6.3
C3514 220P
C3540 0.018
R3541 1K
C3501 0.022
R3501 33K
VR351 200K
R3512 330K
R3514 150K
C3512 22/6.3
R3513 27K
Q3503 2SD734 SWITCH
R3562 22K
R3563 20K
C3510 0.0068
C3511 22/6.3
R3561 100K
R3509 47K
R3510 47K
C3508 0.0022
C3509 0.0015
R3506 330K
C3505 0.015
R3507 15K
C3507 22/6.3
C3506 22/6.3
R3508 150K
R3502 100K
R3503 100K
C3502 0.015
C3503 0.0068
B3502 2SC3399 SWITCH
R3570 47K
R3544 100K
Q3501 2SC536 SWITCH
R3545 150K
D3501 1SS133
D3502 1SS133
R3542 10K
R3528 150K
C3522 0.1
C3521 0.047
C3539 0.068
C3523 0.12
C3538 47/6.3
C3526
THRESH SELECT
S W LOGIC
TRAP
REC AMP
VCC1
VCC2
GND2
C3519 0.001
C3520 0.039
R3527 510
R3526 510
C3537 47/6.3
R3538 10K
R3540 10K
B3901 2SC3400 SWITCH
B3902 2SA1348 SWITCH
R3901 2.7K
Q3901 2SC536 AMP
R3902 22K
R3903 3.3K
R3904 2.2K
D3901 1SS133
D3902
CN305
R3307 10K
B3303 DTA144 SWITCH
D3308
D3310
D3306
R3304 1K
D3307
D3309
C3302 100µ/16
C3301 220µ/16
R3305 1K
D3301
D3303
R3301 22K
D3302
B3301 DTC144 SWITCH
R3303 1K
D3304
D3305
B3302 DTC144 SWITCH
DIODE ALL 1SS133
SY-4
Q7002 2SA984K REG
R7009 3.3K
SWD 12V
R7008 820
D7001 1SS133
D7002 MTZJ12A
R7010 15K
C7003 10K
IC702 LA7910 BAND SELECTOR
Vcc1 NC Vcc2 GND BAND1 BAND2 HB LB
R7001 3.9K
C7004 22/50
L6003 10µ
C6005 4.7/25
C6003 1/50
C6002 4.7/25
L6002 10µ
C7002 0.01
IC703 UPC574J (L5631)REG
IC701 M6M80011P or M6M80021P MEMORY
CS CLK DI DO Vdd RES GND
Q7001 2SC2960-F SWITCH
R7002 10K
R7003 10K
R7005 47K
C7005 180P
C7006 0.1(TF)
R7006 22K
C7007 0.33(TF)
R7007 4.7K
L6004 10µ
R7004 33K
C6004 0.1µ (TF)
Q1601 2SA608 SWITCH
R1611 5.6K
R1610 5.6K
D1604 1SS133
R1613 56
B1601 2SC3399 SWITCH
D1603 1SS133
R1608 22K
R1612 22K
C1603 0.1
TP161
SWD 5V
L1601 100µ
IC161 BA7021 INPUT SELECT
D1602 1SS133
R1628 10K
B1602 2SC3399 INVERTER
C1601 47/6.3
C1616 0.01
R1607 47K
R1604 10K
R1603
R1601 1K
R1602 75
C1604 100/6.3
R1606 47K
R6002 390
D1601 1SS133
C1602 47/6.3
R6001 390
(SWD 12V)
L1603 100µ
Q1602 2SA608 BUFFER
Q1603 2SA608F BUFFER
R1620 5.6K
Q1604 2SC536 AMP
R1615 560
R1617 560
D1605 1SS133
R1625 560
C1611
C1610 100/16
R1616 100
R1614 1.2K
R1618 75
D1606 1SS133
C1606 470/6.3
C1608 33P
R1622 1K
L1602 100µ
C1609 39P
C1612 22/10
Q1605 2SA608 BUFFER
C1607 47/16
R1624 1.8K
R1623 820
R1619 1.3K
R1621 1.8K
F2052
F2151
R2110 1.8K
C2151 150P
R2107 2.7K
R2109 820
R2105 820
R2102 4.3K
R2101 30K
R2108 2.7K
L6006 10µ
R6004 390K
TP162
R2104 4.3K
R2103 47K
R6005 470K
C6001 0.1µ(TF)
JP211
JP212
RF SW P
PB EE 5V
PB C
GND
PB Y
REC Y
GND
REC C
REC 12V
TO VD-1 CN102
BIAS -
BIAS +
SWD 12V
REC H
PB H
LP H
TO AD-1 CN202
AD MUTE
AD OUT
GND
AD LINE IN
AD TUNER IN
EXT (H)
TO AD-1 CN203
VD IN
VD IN
MOD (SWD 5V)
5V (ALWAYS 5V)
TO RF CONVERTER
IF
MB
AFT-C
AGC
SYNC DET
VD OUT
AD MUTE
AD OUT
TO TN-1
IF
MB
AFT
LB
AGC
HB
TU
UB
TO TUNER
SW 5V
AL 5V
C

|  | C2151 | F2151 | F2152 |
|---|---|---|---|
| VHR-4100EX | NOT USE | NOT USE | NOT USE |
| VHR-4100EV | NOT USE | NOT USE | NOT USE |
| VHR-4100G | USE | USE | USE |

VOLTAGE : REC (PLAY)
: STOP MODE (

D

1CC-00100)

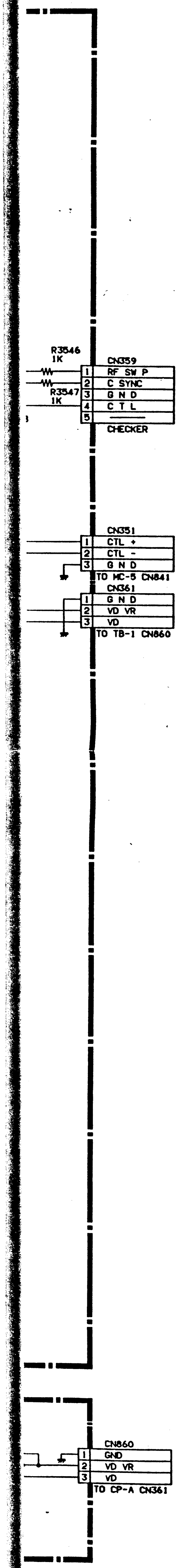

B3502 2SC3399 SWITCH
R3549 150K
R3516 270K
C3513 0.012
R3539 1.6K
D3503 1SS133
D3504 1SS133
R3511 10K
R3512 330K
R3513 27K
R3514 150K
C3512 22/6.3
Q3503 2SD734 SWITCH
R3562 22K
R3563 20K
C3510 0.0068
C3511 22/6.3
R3561 100K
R3570 47K
D3501 1SS133
C3539 0.068
R3542 10K
R3528 150K
C3522 0.1
C3521 0.047
R3544 100K
R3545 150K
Q3501 2SC536 SWITCH
D3502 1SS133
R3529 10K
C3523 0.12
C3538 47/6.3
C3526 1/50(NP)
C3527 0.01
R3531 1K
C3529 0.001
C3531 0.01
R3532 2.2K
R3533 2.2K
C3528 0.22/50
C3530 1/50
IC352 LA7122S AMP
IC351 LC7417-8074 SERVO C.P.U.
REF-TRK
D-WD2
D-WD1
D-PH
TRK-CR
SLOW-CR
MC-BR
SP
LP
T-SPEED
C-FG2
C-FG1
F/R
CPE
CSE
VDD
C-ST/SP
C-P
DPE
FHE
DSE
DFG
RF SW
AF SW
DL 1
DL 2
CTL
REMARK
REC-CTL
D-P
DPG-MH
R3509 47K
R3510 47K
C3508 0.0022
C3509 0.015
R3506 330K
C3505 0.015
R3507 15K
C3507 22/6.3
C3506 22/6.3
R3508 150K
R3502 100K
R3503 100K
C3502 0.015
C3503 0.0068
C3540 0.018
R3541 1K
C3501 0.022
R3501 33K
VR351 200K
THRESH SELECT
S W LOGIC
TRAP
REC AMP
CTL SHAPE
AGC AMP
AGC DET
VREF
VCC1
VCC2
GND1
GND2
C3520 0.039
C3519 0.001
C3518 33/16
R3527 510
R3526 510
C3537 47/6.3
SW 9V
R3538 10K
R3525 360
C3517 0.0022
R3522 220K
C3541 0.001
C3515 10/16
R3520 510K
C3516 3.3/50
R3546 1K
R3547 1K
R3548 1K
CN359
RF SW P
C SYNC
G N D
C T L
CHECKER
CN351
CTL +
CTL -
TO MC-5 CN841
CN361
VD VR
VD
TO TB-1 CN860
R3540 10K
B3902 2SA1348 SWITCH
R3901 2.7K
Q3901 2SC536 AMP
R3902 22K
D3901 1SS133
R3903 3.3K
R3904 2.2K
CN305
R3307 10K
B3303 DTA144 SWITCH
D3308
D3310
D3306
R3304 1K
D3309
D3307
C3302 100μ/16
R3305 1K
C3301 220μ/16
D3301
D3302
D3303
R3301 22K
B3301 DTC144 SWITCH
R3303 1K
D3304
D3305
B3302 DTC144 SWITCH
DIODE ALL 1SS133
SY-4
Q1601 2SA608 SWITCH
R1611 5.6K
R1610 5.6K
D1604 1SS133
R1613 56
B1601 2SC3399 SWITCH
R7006 22K
L6004 10μ
R7007 4.7K
D1603 1SS133
R1608 22K
R1612 22K
C1603 0.1
C6004 0.1μ (TF)
TP161
Q1604 2SC536 AMP
R1622 1K
L1602 100μ
C1609 39P
R1625 560
C1612 22/10
Q1605 2SA608 BUFFER
R1624 1.8K
R1623 820
R1621 1.8K
F2052
F2151
R2110 1.8K
C2151 150P
R2107 2.7K
R2109 820
R2105 820
R2102 4.3K
R2101 30K
R2108 2.7K
CN161
L6006 10μ
R6004 390K
R6005 470K
C6001 0.1μ (TF)
CN860
GND
VR851
TO CP-A CN361
AFT-C
AGC
SYNC DET
VD OUT
AD MUTE
AD OUT
TO TN-1
IF
MB
AFT
LB
HB
TU
UB
TO TUNER
CP-A
TB-1
13
14
15
16
17
18
19
20
21
22
23
24

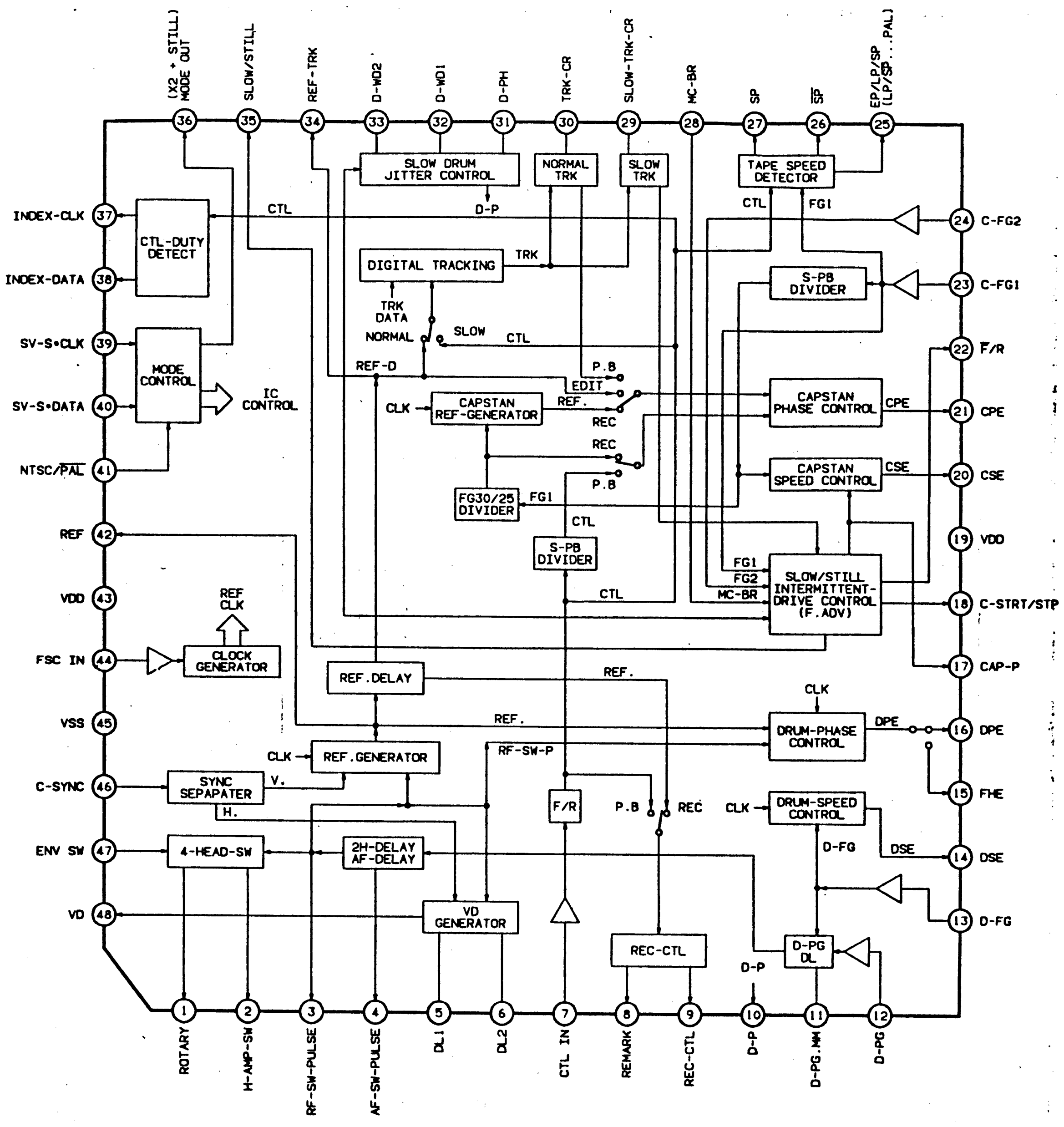
|  | C2151 | F2151 | F2152 |
|---|---|---|---|
| VHR-4100EX | NOT USE | NOT USE | NOT USE |
| VHR-4100EV | NOT USE | NOT USE | NOT USE |
| VHR-4100G | USE | USE | USE |

VOLTAGE : REC (PLAY) MODE
: STOP MODE (PW-A)

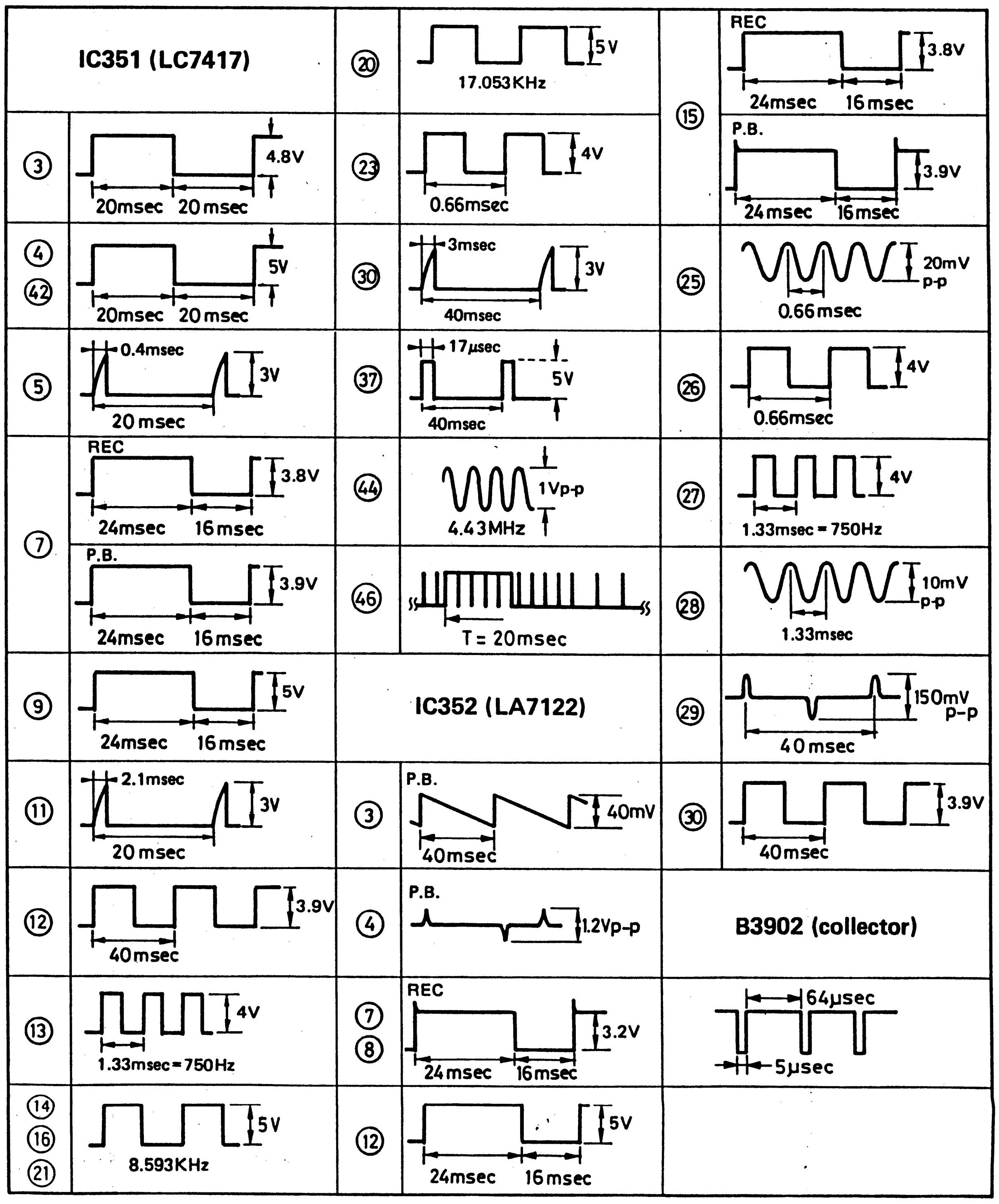
D

## IC351 (LC7417) DIGITAL SERVO IC. INTER BLOCK DIAGRAM


R3546
1K
R3547
1K
CN359
1 RF SW P
2 C SYNC
3 GND
4 CTL
5
CHECKER
CN351
1 CTL +
2 CTL -
3 GND
TO MC-5 CN841
CN361
1 GND
2 VD VR
3 VD
TO TB-1 CN860
CN860
1 GND
2 VD VR
3 VD
TO CP-A CN361

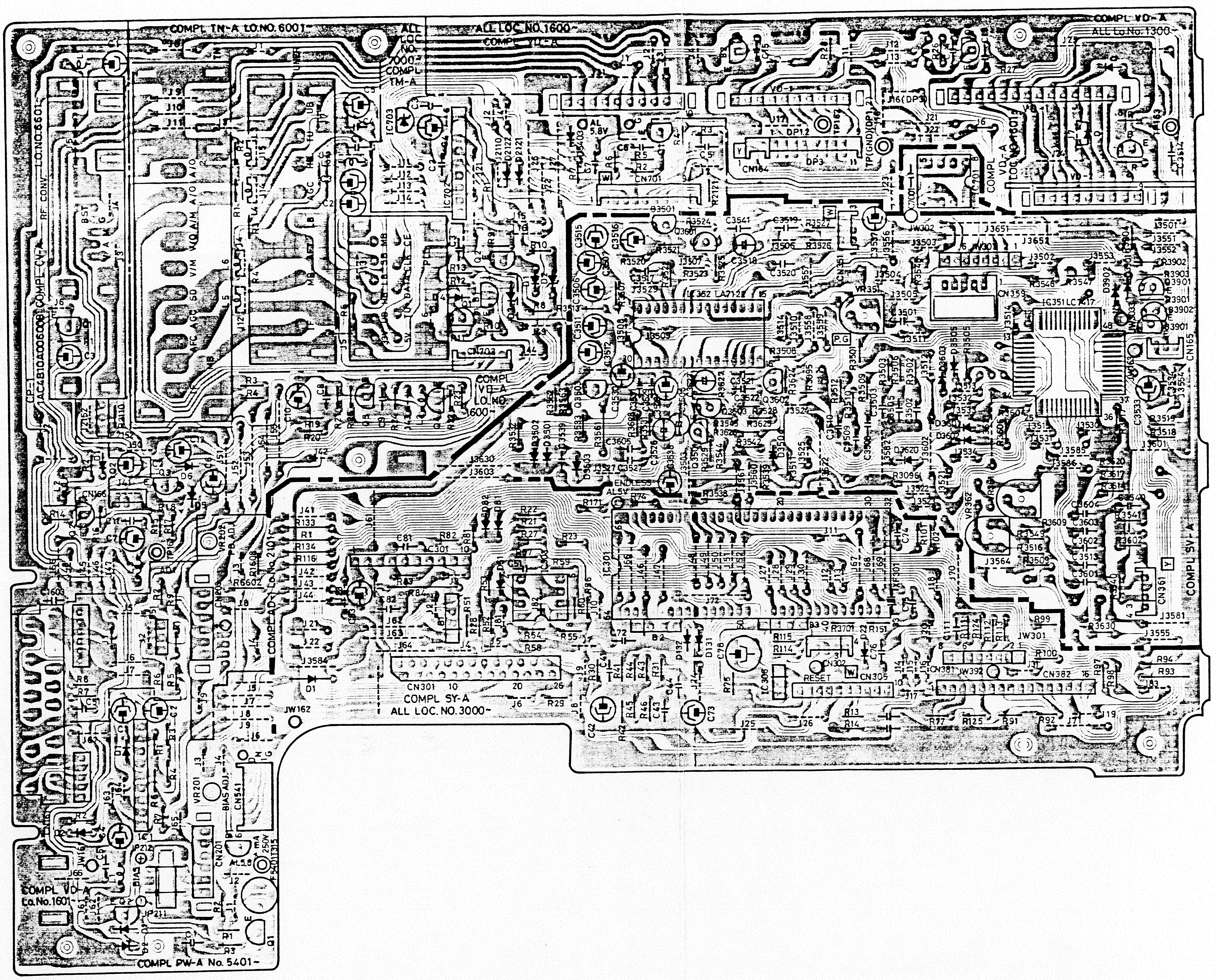

(X2 + STILL) MODE OUT
SLOW/STILL
REF-TRK
D-WD2
D-WD1
D-PH
TRK-CR
SLOW-TRK-CR
MC-BR
SP
SP
EP/LP/SP (LP/SP...PAL)
36
35
34
33
32
31
30
29
28
27
26
25
SLOW DRUM JITTER CONTROL
D-P
NORMAL TRK
SLOW TRK
TAPE SPEED DETECTOR
CTL
FG1
INDEX-CLK 37
INDEX-DATA 38
SV-S•CLK 39
SV-S•DATA 40
NTSC/PAL 41
REF 42
VDD 43
FSC IN 44
VSS 45
C-SYNC 46
ENV SW 47
VD 48
CTL-DUTY DETECT
MODE CONTROL
IC CONTROL
DIGITAL TRACKING
TRK
TRK DATA
NORMAL
SLOW
CTL
REF-D
P.B
EDIT
REF.
REC
CLK
CAPSTAN REF-GENERATOR
FG30/25 DIVIDER
FG1
S-PB DIVIDER
CTL
REF CLK
CLOCK GENERATOR
REF.DELAY
REF.
REF.
CLK
REF.GENERATOR
RF-SW-P
SYNC SEPAPATER
V.
H.
4-HEAD-SW
2H-DELAY AF-DELAY
VD GENERATOR
F/R
P.B
REC
REC-CTL
24 C-FG2
23 C-FG1
S-PB DIVIDER
22 F/R
CAPSTAN PHASE CONTROL
CPE
21 CPE
CAPSTAN SPEED CONTROL
CSE
20 CSE
19 VDD
FG1
FG2
MC-BR
SLOW/STILL INTERMITTENT-DRIVE CONTROL (F.ADV)
18 C-STRT/STP
17 CAP-P
CLK
DRUM-PHASE CONTROL
DPE
16 DPE
15 FHE
CLK
DRUM-SPEED CONTROL
D-FG
DSE
14 DSE
13 D-FG
D-PG DL
D-P
1 ROTARY
2 H-AMP-SW
3 RF-SW-PULSE
4 AF-SW-PULSE
5 DL1
6 DL2
7 CTL IN
8 REMARK
9 REC-CTL
10 D-P
11 D-PG.MM
12 D-PG

## WAVEFORM OF SERVO



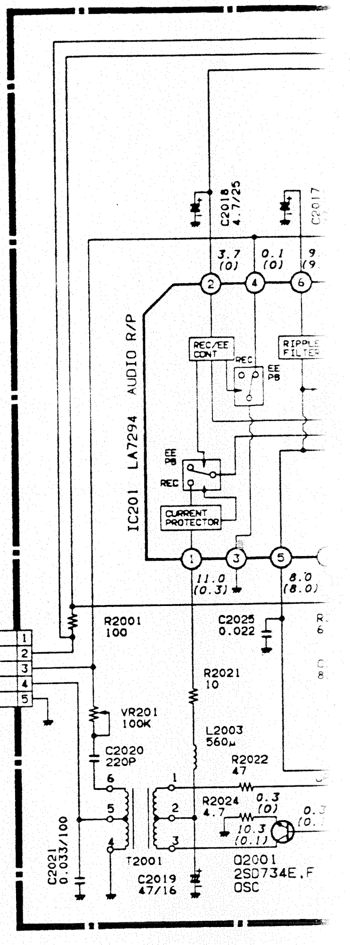
E

## CP-1 MAIN P.C.B.



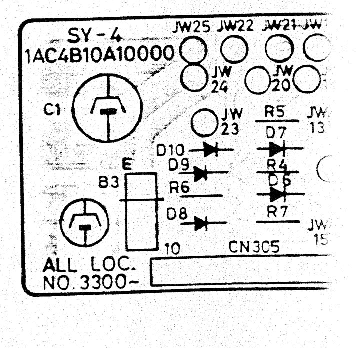
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
COMPL TN-A LO.NO.6001~
ALL LOC NO. 7000~ COMPL TM-A
ALL LOC.NO.1600~ COMPL VD-A
COMPL VD-A ALL Lo.No.1300~
RF CONV. LO.NO.6601~
COMPL CV-A
1AC4B10A006001
CP-1
IC703
IC702
IC701
CN701
CN164
DP3
DP12
TP(GND)(DP12)
TP162
AL 5.8V
COMPL VD-A LO.NO.1601~
COMPL VD-A LO.NO.1600~
IC352 LA7121
IC351 LC7417
CN359
CN165
P.G
ENDLESS
AL5V
IC301
VR362
CN361
COMPL SY-A
COMPL AD
LO.NO.2101~
CN301
COMPL SY-A ALL LOC.NO.3000~
RESET
CN305
CN381
JW392
CN382
JW301
JW302
JW162
VR201
BIAS ADJ
CN541
CN201
BIAS
mA 250V
COMPL VD-A Lo.No.1601~
COMPL PW-A No.5401~

## COMPL. AD-1



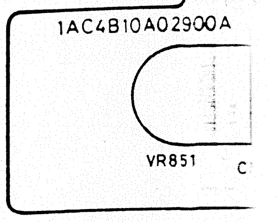
IC201 LA7294 AUDIO R/P
REC/EE CONT
REC
SE PB
CURRENT PROTECTOR
RIPPLE FILTER
C2018 4.7/25
C2017
CN201
GND
R/P HEAD
R/P HEAD
FE, AE
GND
TO MC-5 CN841
R2001 100
C2025 0.022
R2021 10
VR201 100K
L2003 560µ
C2020 220P
R2022 47
R2024 4.7
T2001
C2021 0.033/100
C2019 47/16
Q2001 2SD734E,F OSC
3.7 (0)
0.1 (0)
11.0 (0.3)
8.0 (8.0)
10.3 (0.1)
0.3 (0)

## SY-4 SY P.C



SY-4
1AC4B10A10000
JW25
JW22
JW21
JW 24
JW 20
JW 23
C1
R5
D7
D10
D9
R4
R6
D6
B3
E
D8
R7
ALL LOC. NO.3300~
10
CN305

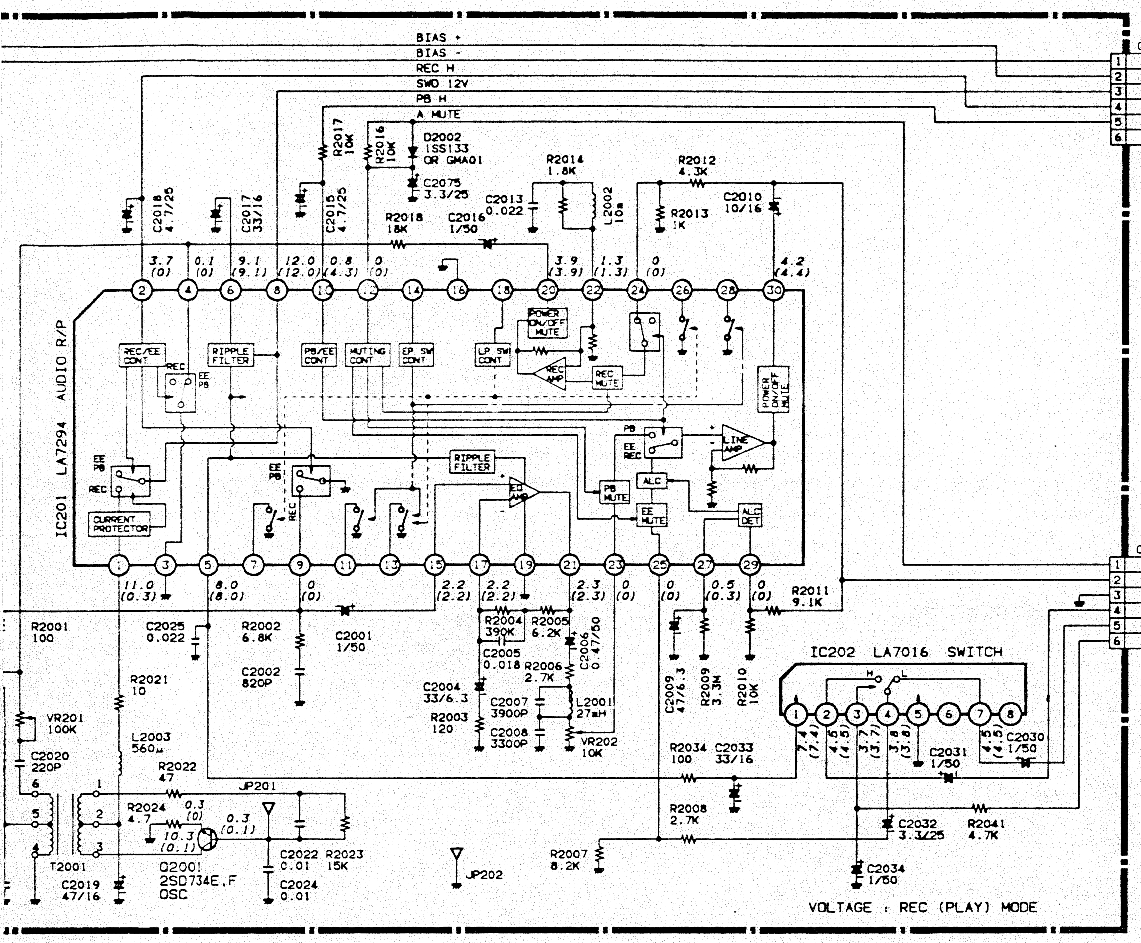
## TB-1 TERMINAL



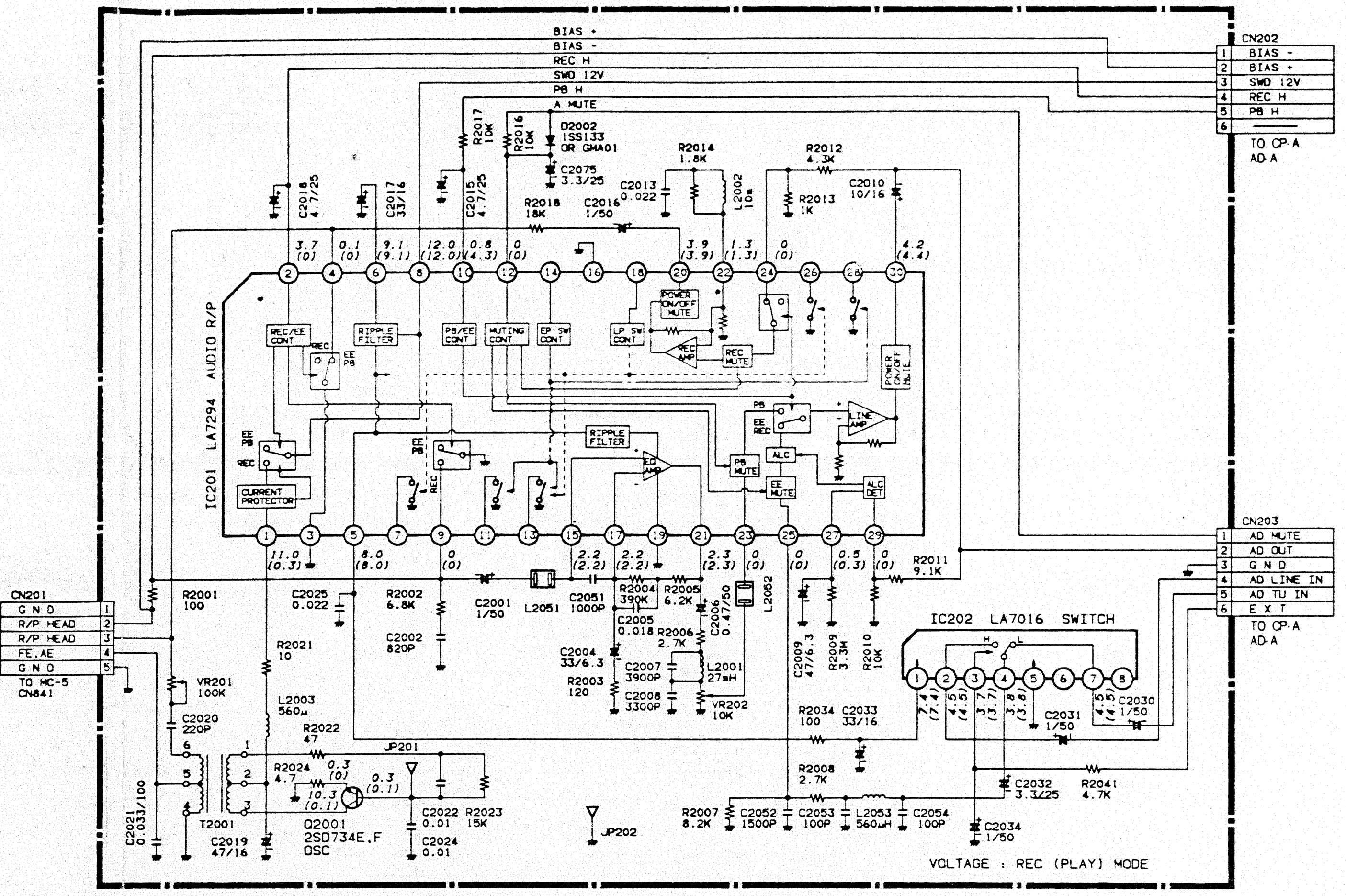
1AC4B10A02900A
VR851

E

## COMPL. AD-1 AUDIO CIRCUIT (VHR-4100EX, EV 1AC-0-B11A-01601)

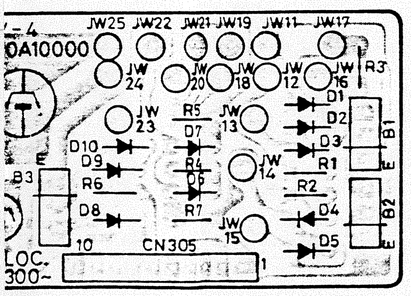

CN202
BIAS -
BIAS +
SWD 12V
REC H
PB H
TO CP-A AD-A
IC201 LA7294 AUDIO R/P
CN203
AD MUTE
AD OUT
G N D
AD LINE IN
AD TU IN
E X T
TO CP-A AD-A
IC202 LA7016 SWITCH
T2001
Q2001 2SD734E,F OSC
JP201
JP202
VOLTAGE : REC (PLAY) MODE

## COMPL. AD-1 AUDIO CIRCUIT (VHR-4100G 1AC-0-B11A-01600)

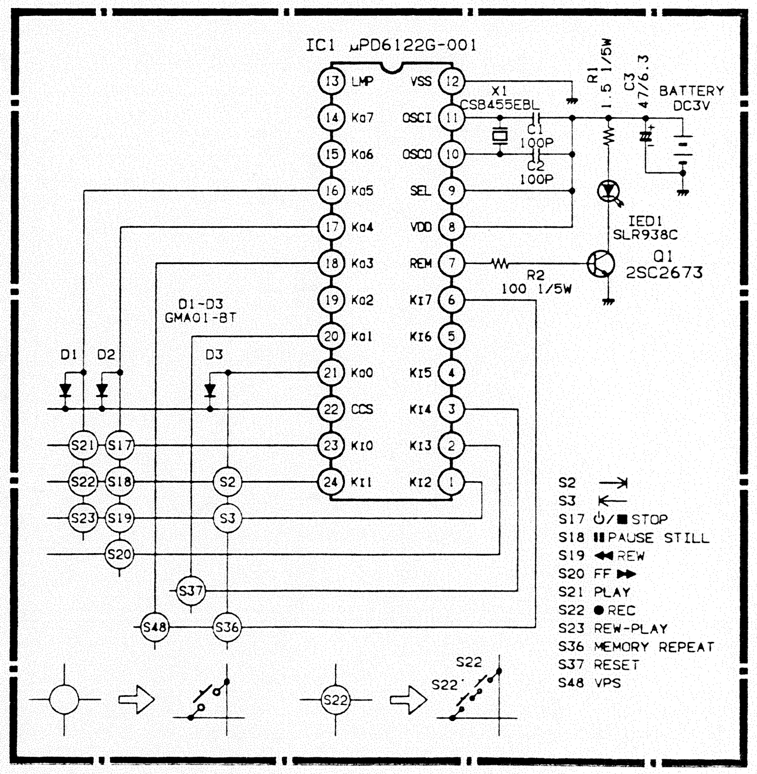

CN202
BIAS -
BIAS +
SWD 12V
REC H
PB H
TO CP-A AD-A
CN201
G N D
R/P HEAD
R/P HEAD
FE,AE
G N D
TO MC-5 CN841
IC201 LA7294 AUDIO R/P
CN203
AD MUTE
AD OUT
G N D
AD LINE IN
AD TU IN
E X T
TO CP-A AD-A
IC202 LA7016 SWITCH
T2001
Q2001 2SD734E,F OSC
JP201
JP202
VOLTAGE : REC (PLAY) MODE

**E**
**VHR-4100EX**
**VHR-4100EV**
**VHR-4100G**

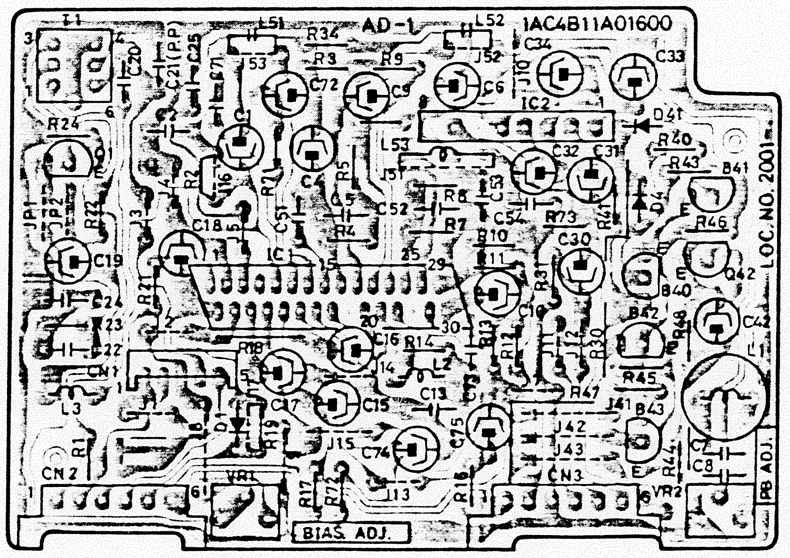
## SY-4 SY P.C.B.


JW25 JW22 JW21 JW19 JW11 JW17
0A10000
CN305
LOC. 300~

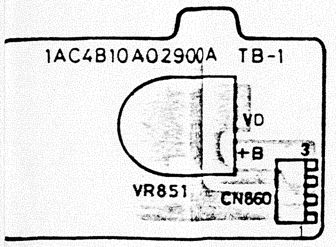
## IR REMOTE CONTROL CIRCUIT (1AC-4-U10A-00100)


IC1 μPD6122G-001
X1 CSB455EBL
C1 100P
C2 100P
R1 1.5 1/5W
C3 47/6.3
BATTERY DC3V
IED1 SLR938C
Q1 2SC2673
R2 100 1/5W
D1-D3 GMA01-BT
D1 D2 D3
S2 →|
S3 |←
S17 ⏻/■ STOP
S18 ❚❚ PAUSE STILL
S19 ◀◀ REW
S20 FF ▶▶
S21 PLAY
S22 ● REC
S23 REW-PLAY
S36 MEMORY REPEAT
S37 RESET
S48 VPS

## AD-1 AUDIO P.C.B.

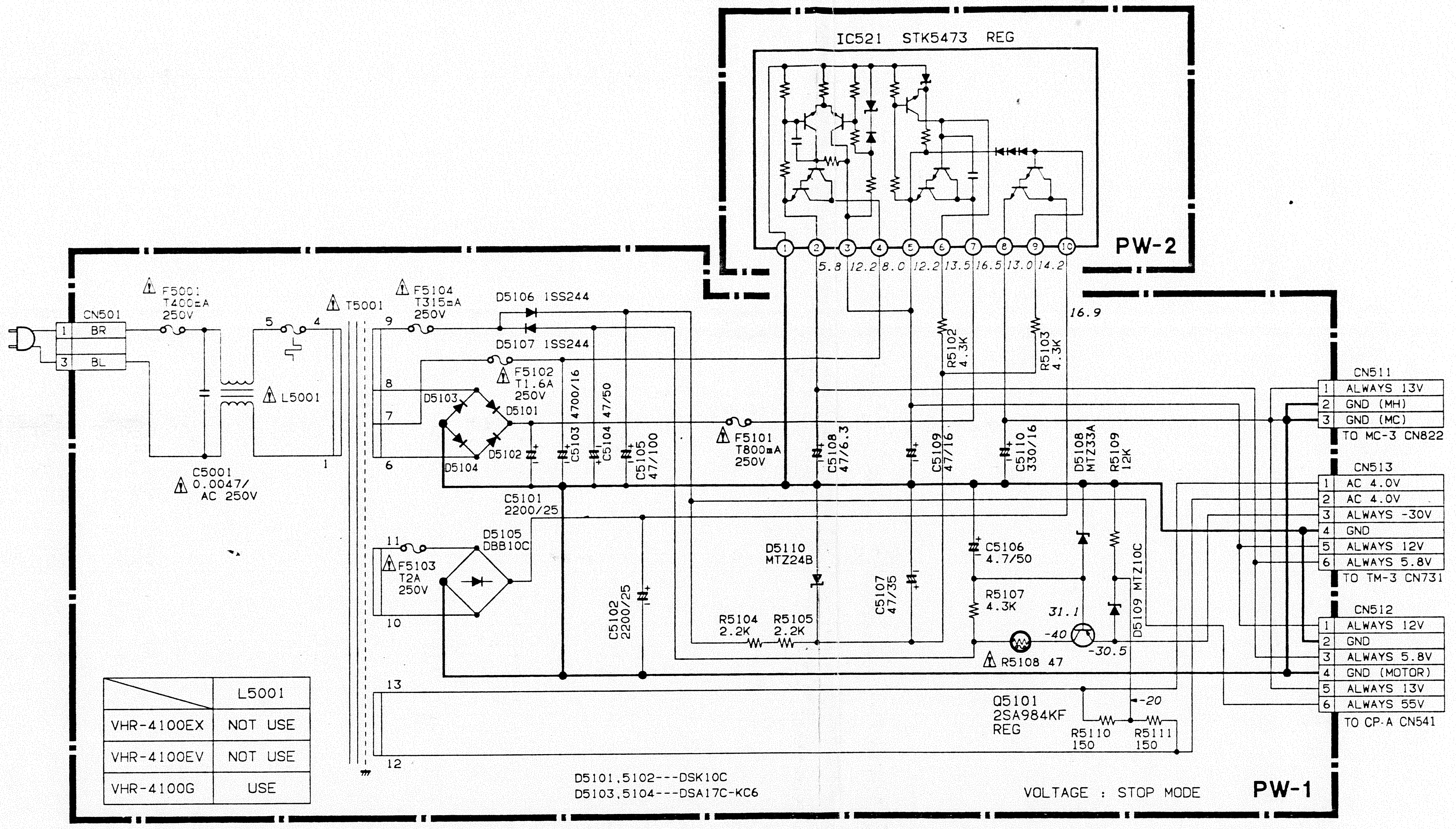

AD-1
1AC4B11A01600
IC2
CN2
CN3
VR1
VR2
BIAS ADJ.
PB ADJ.
LOC. NO. 2001~

## TB-1 TERMINAL P.C.B.


1AC4B10A02900A TB-1
VD
+B
VR851
CN860

F

## COMPL. PW-1 POWER SUPPLY CIRCUIT (VHR-4100EX, EV 1AC-0-B11A-00601)
## (VHR-4100G 1AC-0-B11A-00600)
## COMPL. PW-2 POWER SUPPLY CIRCUIT (1AC-0-B11A-01000)


IC521 STK5473 REG
PW-2
5.8
12.2
8.0
12.2
13.5
16.5
13.0
14.2
16.9
CN501
1 BR
3 BL
F5001
T400mA
250V
C5001
0.0047/
AC 250V
L5001
T5001
F5104
T315mA
250V
D5106 1SS244
D5107 1SS244
F5102
T1.6A
250V
D5103
D5101
D5102
D5104
C5103 4700/16
C5104 47/50
C5105 47/100
C5101
2200/25
F5101
T800mA
250V
C5108 47/6.3
C5109 47/16
C5110 330/16
R5102 4.3K
R5103 4.3K
D5108 MTZ33A
R5109 12K
D5105
DBB10C
F5103
T2A
250V
C5102
2200/25
D5110
MTZ24B
C5107
47/35
C5106
4.7/50
R5107
4.3K
R5104
2.2K
R5105
2.2K
R5108 47
31.1
-40
-30.5
-20
D5109 MTZ10C
Q5101
2SA984KF
REG
R5110
150
R5111
150
CN511
1 ALWAYS 13V
2 GND (MH)
3 GND (MC)
TO MC-3 CN822
CN513
1 AC 4.0V
2 AC 4.0V
3 ALWAYS -30V
4 GND
5 ALWAYS 12V
6 ALWAYS 5.8V
TO TM-3 CN731
CN512
1 ALWAYS 12V
2 GND
3 ALWAYS 5.8V
4 GND (MOTOR)
5 ALWAYS 13V
6 ALWAYS 55V
TO CP-A CN541
1
4
5
6
7
8
9
10
11
12
13
PW-1

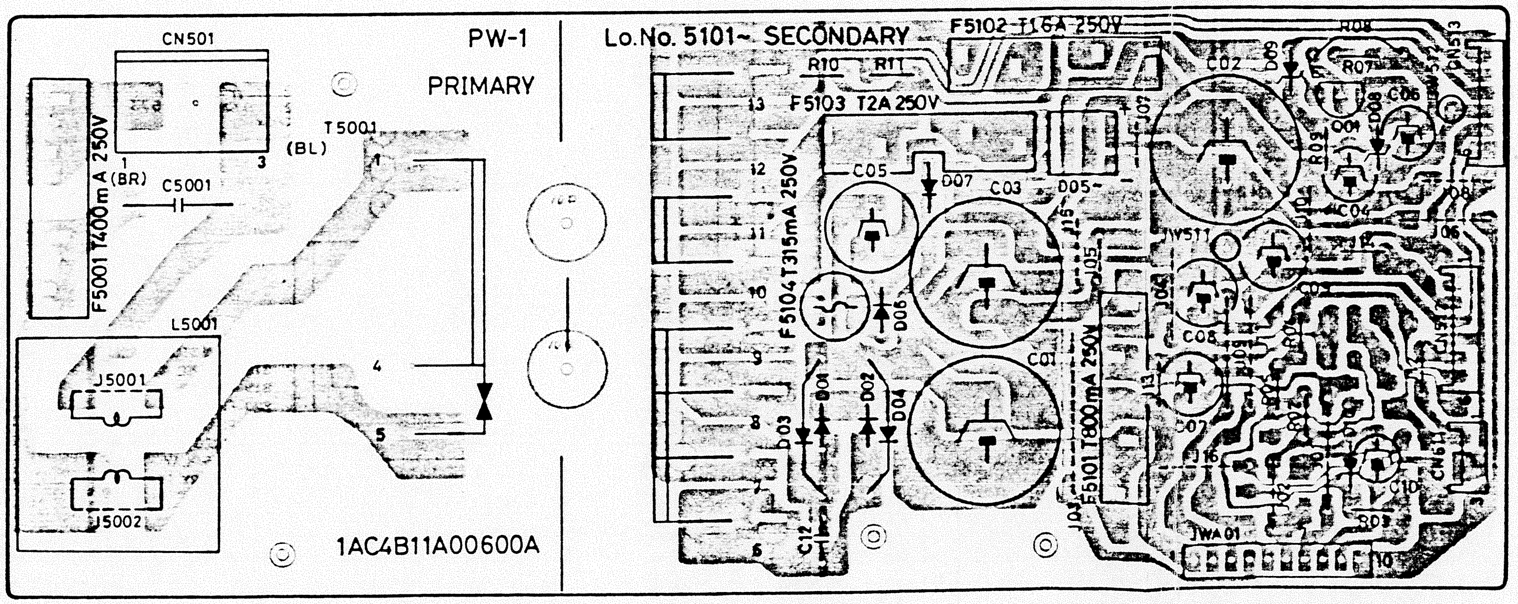
| | L5001 |
|---|---|
| VHR-4100EX | NOT USE |
| VHR-4100EV | NOT USE |
| VHR-4100G | USE |

D5101,5102---DSK10C
D5103,5104---DSA17C-KC6

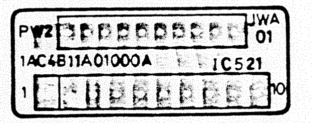
VOLTAGE : STOP MODE

**F**
**VHR-4100EX**
**VHR-4100EV**
**VHR-4100G**

## PW-1 POWER SUPPLY P.C.B.

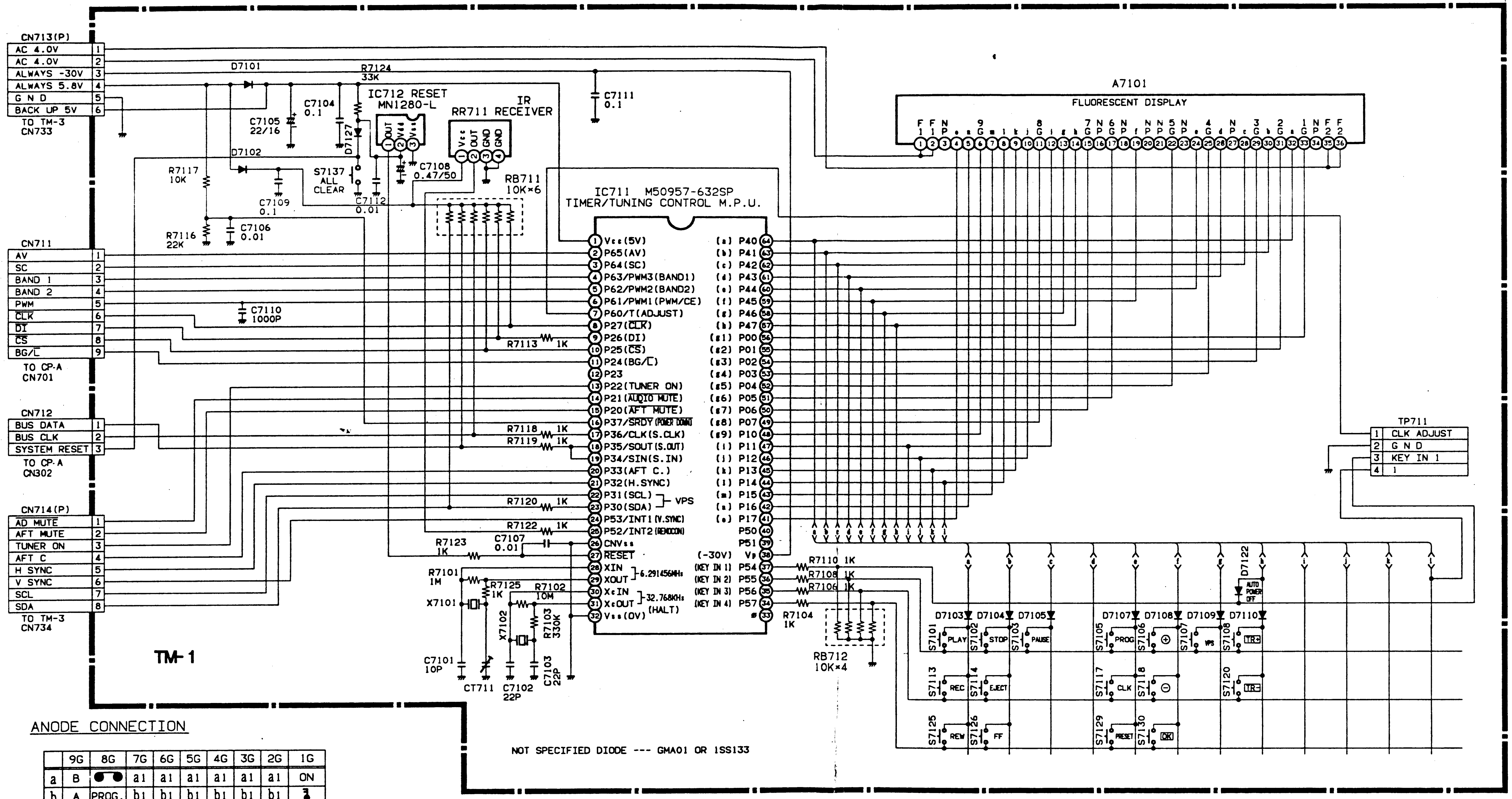

CN501
PW-1
PRIMARY
Lo.No. 5101~ SECONDARY
F5102 T1.6A 250V
R10
R11
F5103 T2A 250V
T5001
(BR)
(BL)
C5001
F5001 T400mA 250V
L5001
J5001
J5002
C05
D07
C03
D05
F5104 T315mA 250V
D06
D01
D02
D04
D03
C12
F5101 T800mA 250V
C02
R07
R08
Q01
JW511
C08
JWA 01
CN511
CN512
CN513
1AC4B11A00600A

## PW-2 POWER SUPPLY P.C.B.


PW2
JWA
01
1AC4B11A01000A
IC521
1
10

F

# COMPL. TM-1 DISPLAY, TIMER, TUNING CONTROL CIRCUIT (1AC-0-B10A-00700)

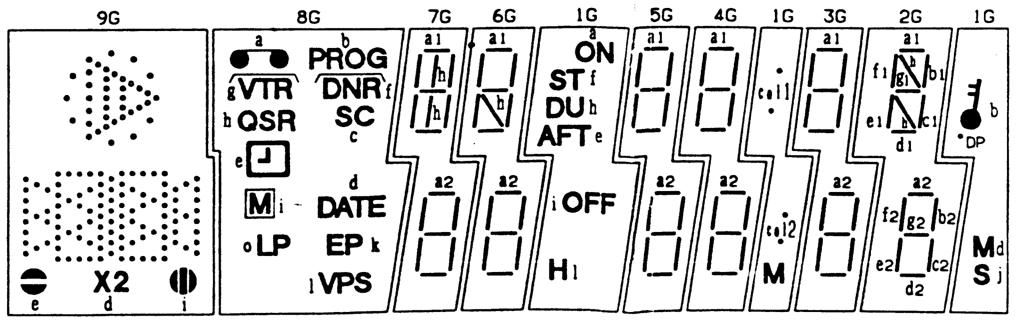


CN713(P)
1 AC 4.0V
2 AC 4.0V
3 ALWAYS -30V
4 ALWAYS 5.8V
5 G N D
6 BACK UP 5V
TO TM-3 CN733
D7101
R7124 33K
IC712 RESET MN1280-L
IR RR711 RECEIVER
C7104 0.1
C7105 22/16
D7127
D7102
C7111 0.1
R7117 10K
S7137 ALL CLEAR
C7108 0.47/50
C7109 0.1
C7112 0.01
RB711 10K×6
R7116 22K
C7106 0.01
IC711 M50957-632SP
TIMER/TUNING CONTROL M.P.U.
1 Vcc(5V)
2 P65(AV)
3 P64(SC)
4 P63/PWM3(BAND1)
5 P62/PWM2(BAND2)
6 P61/PWM1(PWM/CE)
7 P60/T(ADJUST)
8 P27(CLK)
9 P26(DI)
10 P25(CS)
11 P24(BG/L)
12 P23
13 P22(TUNER ON)
14 P21(AUDIO MUTE)
15 P20(AFT MUTE)
16 P37/SRDY(POWER DOWN)
17 P36/CLK(S.CLK)
18 P35/SOUT(S.OUT)
19 P34/SIN(S.IN)
20 P33(AFT C.)
21 P32(H.SYNC)
22 P31(SCL)
23 P30(SDA)
VPS
24 P53/INT1(V.SYNC)
25 P52/INT2(REMOCON)
26 CNVss
27 RESET
28 XIN
29 XOUT
6.291456MHz
30 XcIN
31 XcOUT
32.768KHz (HALT)
32 Vss(0V)
(a) P40 64
(b) P41 63
(c) P42 62
(d) P43 61
(e) P44 60
(f) P45 59
(g) P46 58
(h) P47 57
(g1) P00 56
(g2) P01 55
(g3) P02 54
(g4) P03 53
(g5) P04 52
(g6) P05 51
(g7) P06 50
(g8) P07 49
(g9) P10 48
(i) P11 47
(j) P12 46
(k) P13 45
(l) P14 44
(m) P15 43
(n) P16 42
(o) P17 41
P50 40
P51 39
(-30V) Vp 38
(KEY IN 1) P54 37
(KEY IN 2) P55 36
(KEY IN 3) P56 35
(KEY IN 4) P57 34
33
CN711
1 AV
2 SC
3 BAND 1
4 BAND 2
5 PWM
6 CLK
7 DI
8 CS
9 BG/L
TO CP-A CN701
C7110 1000P
R7113 1K
CN712
1 BUS DATA
2 BUS CLK
3 SYSTEM RESET
TO CP-A CN302
R7118 1K
R7119 1K
R7120 1K
R7122 1K
CN714(P)
1 AD MUTE
2 AFT MUTE
3 TUNER ON
4 AFT C
5 H SYNC
6 V SYNC
7 SCL
8 SDA
TO TM-3 CN734
R7123 1K
C7107 0.01
R7101 1M
R7125 1K
R7102 10M
X7101
X7102
R7103 330K
C7101 10P
CT711
C7102 22P
C7103 22P
TM-1
R7110 1K
R7108 1K
R7106 1K
R7104 1K
RB712 10K×4
A7101
FLUORESCENT DISPLAY
F F N 9 8 7 N 6 N N 5 N 4 N 3 2 1 N F F
1 1 P a G m l k j G i g h G P G P f P P G P e G d P c G b G a G P 2 2
TP711
1 CLK ADJUST
2 G N D
3 KEY IN 1
4 1
D7122
AUTO POWER OFF
D7103 D7104 D7105 D7107 D7108 D7109 D7110
S7101 PLAY
S7102 STOP
S7103 PAUSE
S7105 PROG
S7106
S7107 VPS
S7108 TR+
S7113 REC
S7114 EJECT
S7117 CLK
S7118
S7120 TR-
S7125 REW
S7126 FF
S7129 PRESET
S7130 OK
NOT SPECIFIED DIODE --- GMA01 OR 1SS133

## ANODE CONNECTION

| | 9G | 8G | 7G | 6G | 5G | 4G | 3G | 2G | 1G |
|---|---|---|---|---|---|---|---|---|---|
| a | B | ●━● | a1 | a1 | a1 | a1 | a1 | a1 | ON |
| b | A | PROG. | b1 | b1 | b1 | b1 | b1 | b1 | 🌡 |
| c | – | SC | c1 | c1 | c1 | c1 | c1 | c1 | DP |
| d | ×2 | DATE | d1 | d1 | d1 | d1 | d1 | d1 | M(1) |
| e | ⊖ | ◰ | e1 | e1 | e1 | e1 | e1 | e1 | AFT |
| f | C | DNR | f1 | f1 | f1 | f1 | f1 | f1 | ST |
| g | D | VTR | g1 | g1 | g1 | g1 | g1 | g1 | col*1 |
| h | – | QSR | ╱ | ╲ | – | – | – | ╲ | DU |
| i | ◍ | M | a2 | a2 | a2 | a2 | a2 | a2 | OFF |
| j | E | – | b2 | b2 | b2 | b2 | b2 | b2 | S |
| k | I | EP | c2 | c2 | c2 | c2 | c2 | c2 | – |
| l | H | VPS | d2 | d2 | d2 | d2 | d2 | d2 | H |
| m | J | – | e2 | e2 | e2 | e2 | e2 | e2 | M(2) |
| n | F | – | f2 | f2 | f2 | f2 | f2 | f2 | – |
| o | G | LP | g2 | g2 | g2 | g2 | g2 | g2 | col*2 |

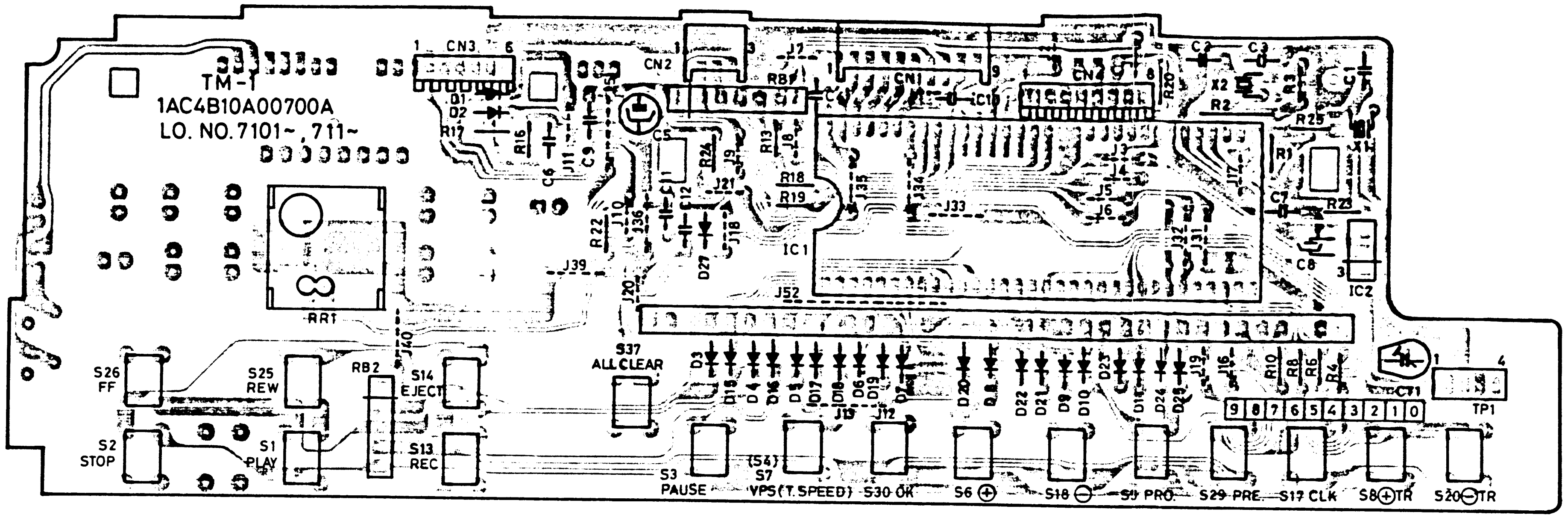
## GRID ASSIGNMENT



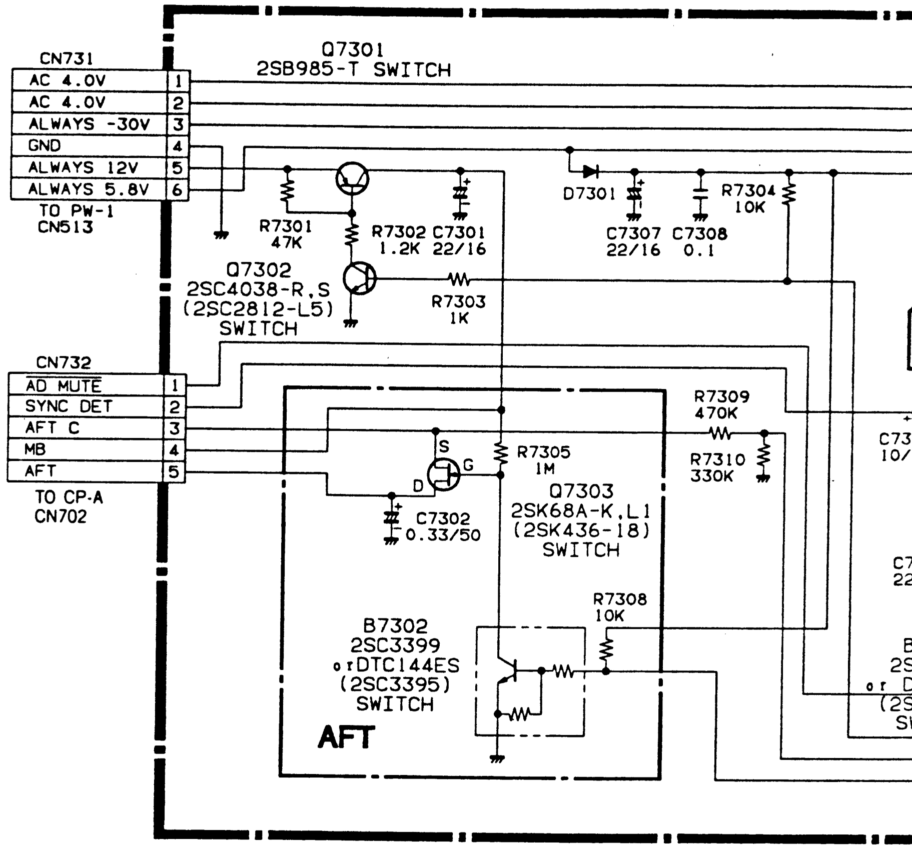
9G
8G
7G
6G
1G
5G
4G
1G
3G
2G
1G
X2
PROG
VTR
DNR
QSR
SC
DATE
LP
EP
VPS
ON
ST
DU
AFT
OFF
H
M
M
S
DP
a1
a2
b1
b2
c1
c2
d1
d2
e1
e2
f1
f2
g1
g2

6

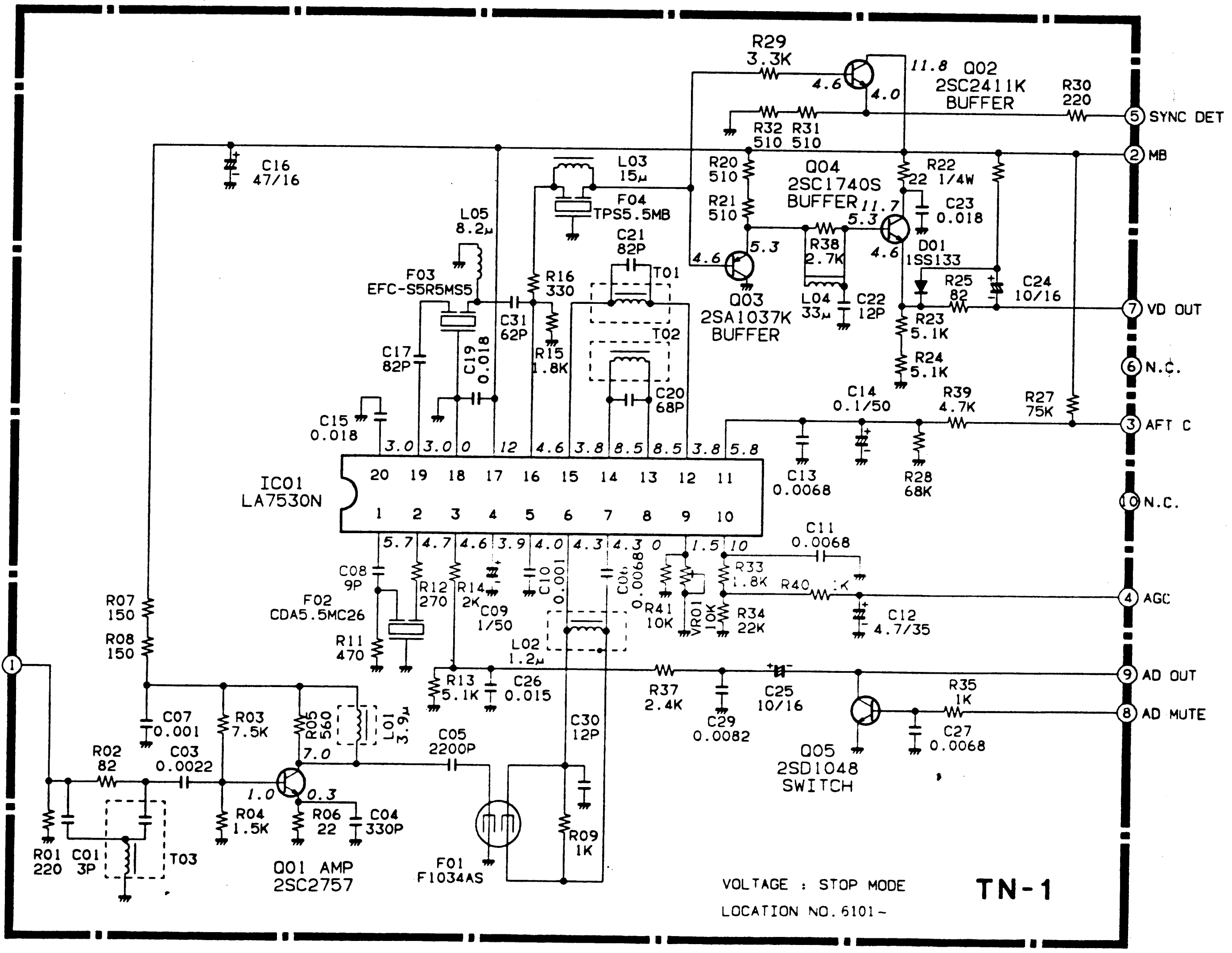
## TM-1 DISPLAY, TIMER, TUNING CONTROL P.C.B.


TM-1
1AC4B10A00700A
LO. NO.7101~,711~
CN3
CN2
CN1
IC1
IC2
RR1
J39
J52
S37
ALL CLEAR
S26
FF
S25
REW
S14
EJECT
S2
STOP
S1
PLAY
S13
REC
RB2
S3
PAUSE
(S4)
S7
VPS(T.SPEED)
S30 OK
S6 ⊕
S18 ⊖
S9 PRO.
S29 PRE.
S17 CLK
S8⊕TR
S20⊖TR
TP1
C71

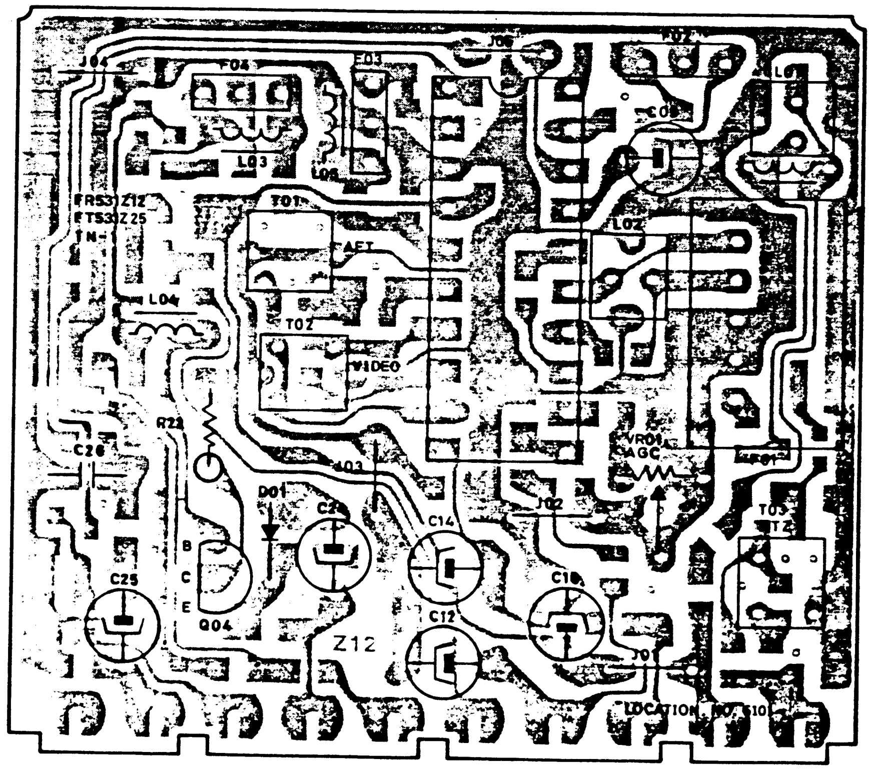
## COMPL. TM-3 VPS, AFT CIRCUIT (VHR-4100EX

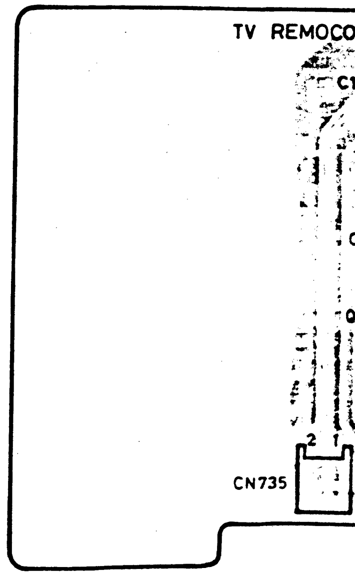

CN731
AC 4.0V 1
AC 4.0V 2
ALWAYS -30V 3
GND 4
ALWAYS 12V 5
ALWAYS 5.8V 6
TO PW-1
CN513
Q7301
2SB985-T SWITCH
R7301 47K
R7302 1.2K
C7301 22/16
Q7302
2SC4038-R,S
(2SC2812-L5)
SWITCH
R7303 1K
D7301
C7307 22/16
C7308 0.1
R7304 10K
CN732
AD MUTE 1
SYNC DET 2
AFT C 3
MB 4
AFT 5
TO CP-A
CN702
R7309 470K
R7310 330K
R7305 1M
Q7303
2SK68A-K,L1
(2SK436-18)
SWITCH
C7302 0.33/50
R7308 10K
B7302
2SC3399
or DTC144ES
(2SC3395)
SWITCH
AFT

## COMPL. TN-1 TUNER IF CIRCUIT (143-0-233V-36200)


R29 3.3K
Q02 2SC2411K BUFFER
R30 220
⑤ SYNC DET
R32 510
R31 510
② MB
C16 47/16
L03 15μ
F04 TPS5.5MB
Q04 2SC1740S BUFFER
R20 510
R21 510
R22 22 1/4W
C23 0.018
D01 1SS133
L05 8.2μ
C21 82P
T01
T02
F03 EFC-S5R5MS5
R16 330
R15 1.8K
C31 62P
C17 82P
C19 0.018
C20 68P
Q03 2SA1037K BUFFER
R38 2.7K
L04 33μ
C22 12P
R25 82
C24 10/16
R23 5.1K
R24 5.1K
⑦ VD OUT
⑥ N.C.
C14 0.1/50
R39 4.7K
R27 75K
③ AFT C
C15 0.018
IC01 LA7530N
C13 0.0068
R28 68K
⑩ N.C.
C11 0.0068
C08 9P
F02 CDA5.5MC26
R12 270
R14 2K
C09 1/50
C10 0.001
C06 0.0068
R41 10K
VR01 10K
R33 1.8K
R34 22K
R40 1K
C12 4.7/35
④ AGC
R07 150
R08 150
R11 470
L02 1.2μ
R13 5.1K
C26 0.015
R37 2.4K
C25 10/16
⑨ AD OUT
R35 1K
⑧ AD MUTE
IF ① TO TUNER
C07 0.001
R03 7.5K
R05 560
L01 3.9μ
C29 0.0082
C27 0.0068
Q05 2SD1048 SWITCH
R02 82
C03 0.0022
C05 2200P
C30 12P
R04 1.5K
R06 22
C04 330P
R09 1K
R01 220
C01 3P
T03
Q01 AMP 2SC2757
F01 F1034AS
VOLTAGE : STOP MODE
LOCATION NO. 6101~
TN-1

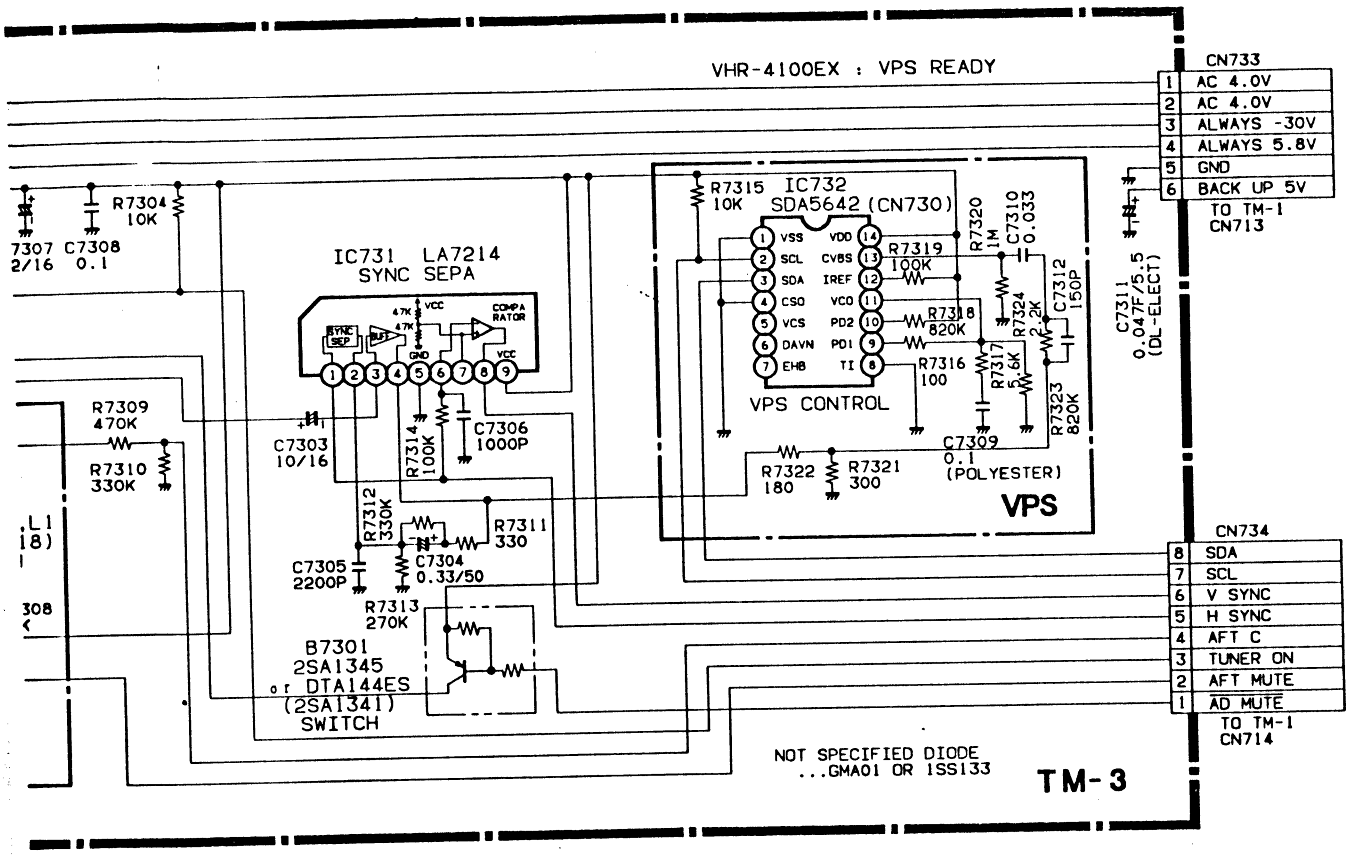
## TN-1 TUNER IF P.C.B.


F04
F03
L03
T01
T02
L04
VIDEO
AFT
VR01 AGC
D01
Q04
Z12
C25
C14
C12
C10
LOCATION NO. 610


TV REMOCO
CN735

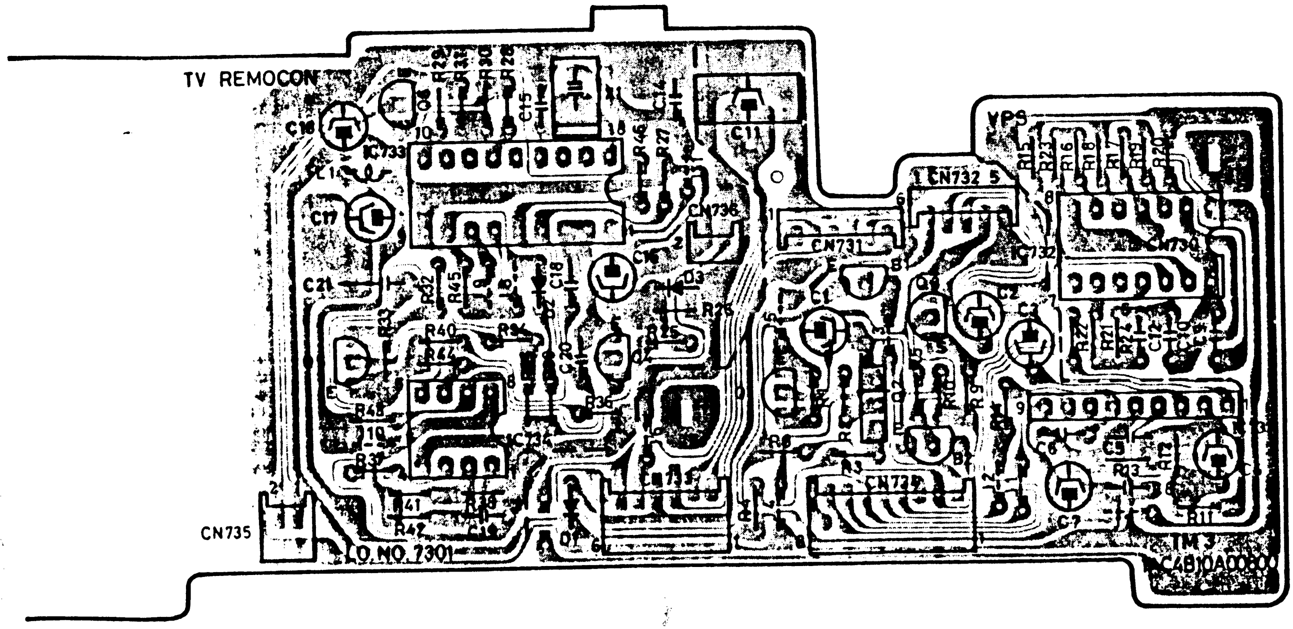
G

## RCUIT (VHR-4100EX 1AC-0-B10A-00800) (VHR-4100EV, G 1AC-0-B10A-00801)


VHR-4100EX : VPS READY
CN733
1 AC 4.0V
2 AC 4.0V
3 ALWAYS -30V
4 ALWAYS 5.8V
5 GND
6 BACK UP 5V
TO TM-1 CN713
R7304 10K
7307 2/16
C7308 0.1
IC731 LA7214 SYNC SEPA
SYNC SEP
BUF
COMPA RATOR
VCC
GND
47K
R7315 10K
IC732 SDA5642 (CN730)
VSS
SCL
SDA
CSO
VCS
DAVN
EHB
VDD
CVBS
IREF
VCO
PD2
PD1
TI
R7319 100K
R7318 820K
R7316 100
R7320 1M
C7310 0.033
R7324 2.2K
C7312 150P
R7317 5.6K
R7323 820K
C7311 0.047F/5.5 (DL-ELECT)
VPS CONTROL
C7309 0.1 (POLYESTER)
R7322 180
R7321 300
VPS
R7309 470K
R7310 330K
C7303 10/16
R7314 100K
C7306 1000P
R7312 330K
R7311 330
C7305 2200P
C7304 0.33/50
R7313 270K
B7301 2SA1345 or DTA144ES (2SA1341) SWITCH
L1 18)
308
CN734
8 SDA
7 SCL
6 V SYNC
5 H SYNC
4 AFT C
3 TUNER ON
2 AFT MUTE
1 AD MUTE
TO TM-1 CN714
NOT SPECIFIED DIODE ...GMA01 OR 1SS133
TM-3

**G**
**VHR-4100EX**
**VHR-4100EV**
**VHR-4100G**

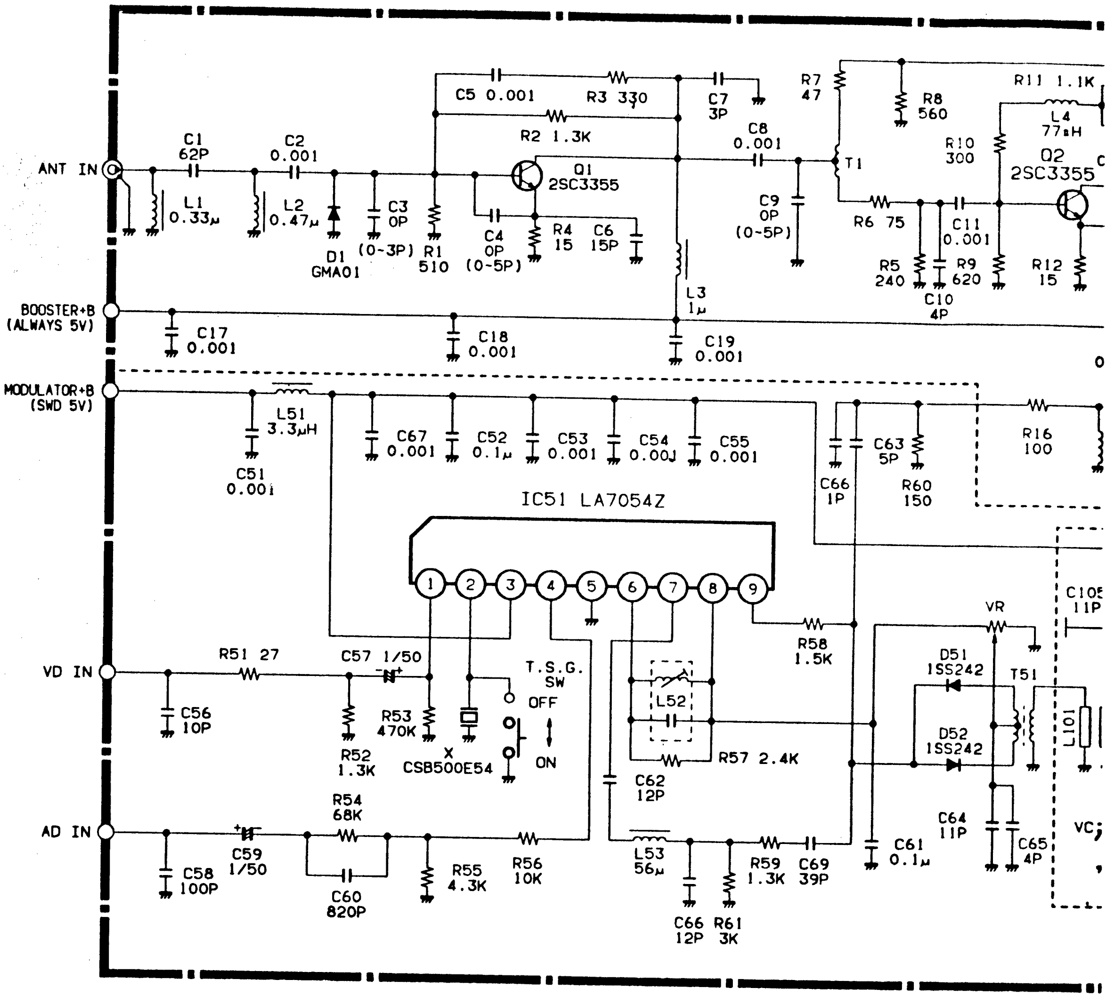
## TM-3 VPS, AFT P.C.B.


TV REMOCON
VPS
IC733
CN736
CN731
CN732
IC732
CN730
IC734
CN735
CN734
CN733
Q.NO.7301
TM-3
C4B10A00800

16 17 18 19 20 21 22

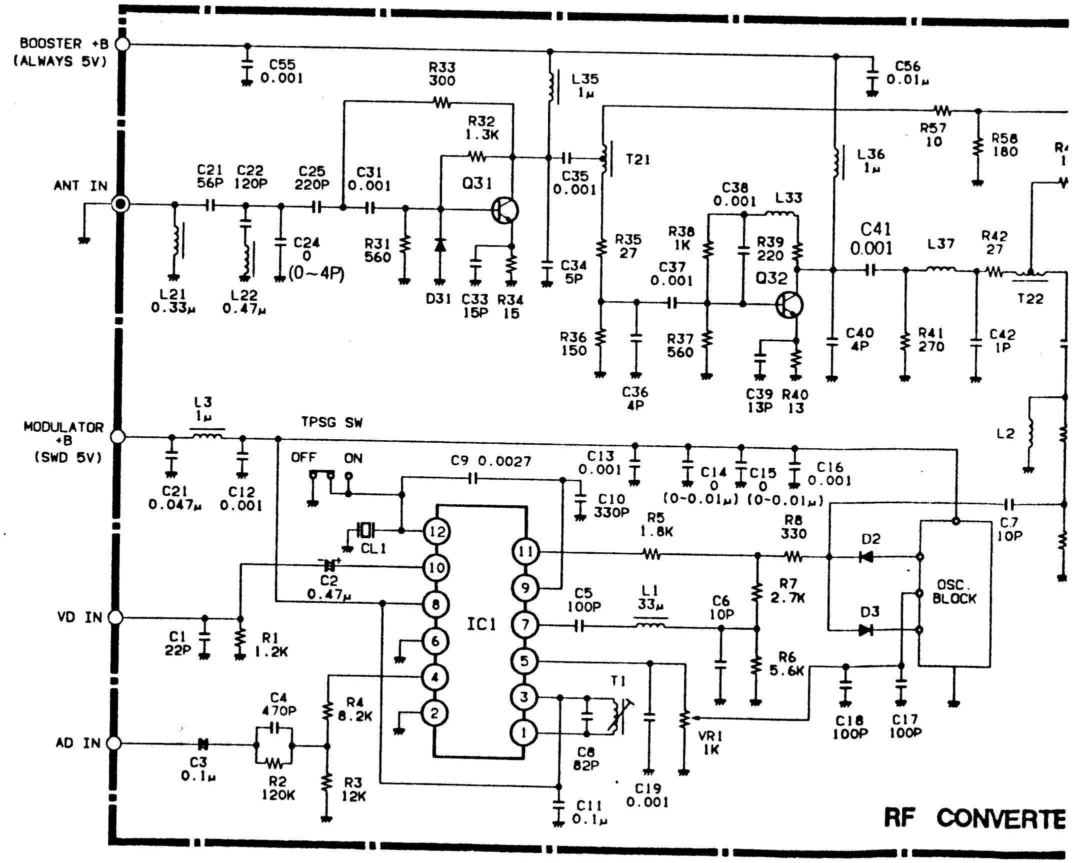
H

## RF CONVERTER CIRCUIT (1AC-4-F2AG-000


ANT IN
BOOSTER+B (ALWAYS 5V)
MODULATOR+B (SWD 5V)
VD IN
AD IN
C1 62P
C2 0.001
L1 0.33μ
L2 0.47μ
D1 GMA01
C3 0P (0~3P)
R1 510
C5 0.001
R3 330
R2 1.3K
Q1 2SC3355
C4 0P (0~5P)
R4 15
C6 15P
C7 3P
C8 0.001
C9 0P (0~5P)
L3 1μ
R7 47
R8 560
T1
R6 75
R5 240
C11 0.001
R9 620
C10 4P
R10 300
R11 1.1K
L4 77nH
Q2 2SC3355
R12 15
C17 0.001
C18 0.001
C19 0.001
L51 3.3μH
C51 0.001
C67 0.001
C52 0.1μ
C53 0.001
C54 0.00J
C55 0.001
C66 1P
C63 5P
R60 150
R16 100
IC51 LA7054Z
R58 1.5K
R51 27
C56 10P
C57 1/50
R53 470K
R52 1.3K
X CSB500E54
T.S.G. SW
OFF
ON
L52
C62 12P
R57 2.4K
VR
C105 11P
D51 1SS242
D52 1SS242
T51
L101
C64 11P
C65 4P
VC
C61 0.1μ
R54 68K
C59 1/50
C58 100P
C60 820P
R55 4.3K
R56 10K
L53 56μ
R59 1.3K
C69 39P
C66 12P
R61 3K

VHR-4100EX
VHR-4100EV
VHR-4100G

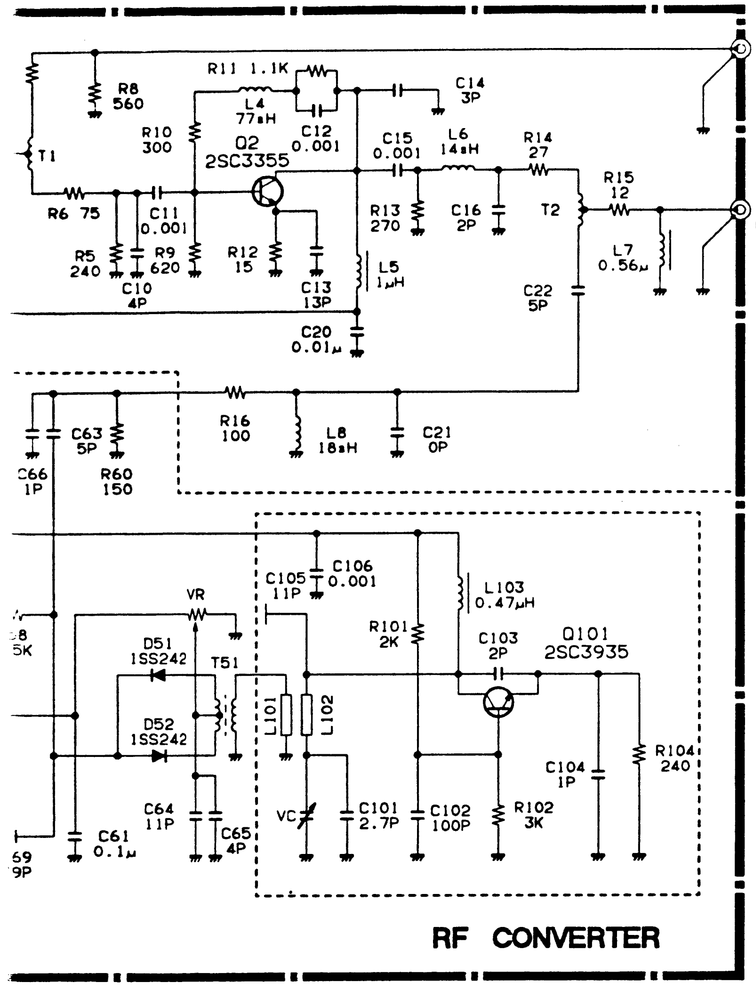
## RF CONVERTER CIRCUIT (1AC-4-F2AG-0002


BOOSTER +B (ALWAYS 5V)
ANT IN
MODULATOR +B (SWD 5V)
VD IN
AD IN
C55 0.001
R33 300
L35 1μ
C56 0.01μ
R32 1.3K
T21
R57 10
R58 180
C21 56P
C22 120P
C25 220P
C31 0.001
Q31
C35 0.001
L36 1μ
C38 0.001
L33
L21 0.33μ
L22 0.47μ
C24 0 (0~4P)
R31 560
D31
C33 15P
R34 15
C34 5P
R35 27
R38 1K
R39 220
C37 0.001
Q32
C41 0.001
L37
R42 27
T22
R36 150
C36 4P
R37 560
C39 13P
R40 13
C40 4P
R41 270
C42 1P
L3 1μ
TPSG SW
OFF ON
C21 0.047μ
C12 0.001
C9 0.0027
C13 0.001
C14 0 (0~0.01μ)
C15 0 (0~0.01μ)
C16 0.001
C10 330P
CL1
C2 0.47μ
R5 1.8K
R8 330
D2
C7 10P
L2
IC1
C5 100P
L1 33μ
C6 10P
R7 2.7K
OSC. BLOCK
D3
C1 22P
R1 1.2K
R6 5.6K
C18 100P
C17 100P
C4 470P
R4 8.2K
T1
VR1 1K
C3 0.1μ
R2 120K
R3 12K
C8 82P
C19 0.001
C11 0.1μ
RF CONVERTE

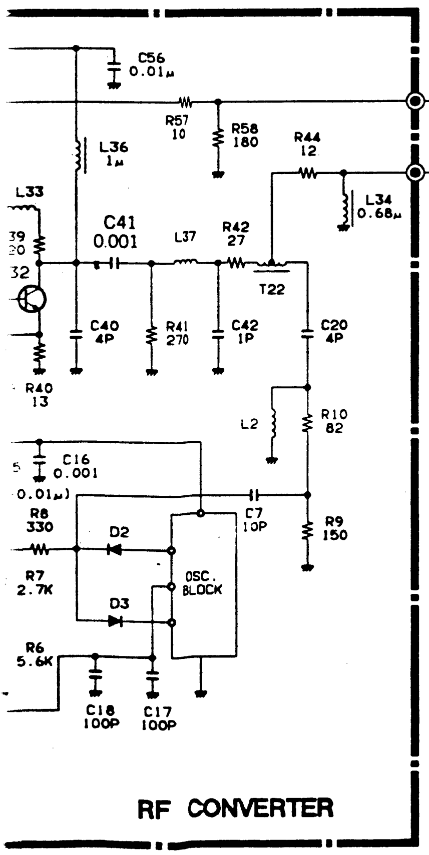
K
J
I
H
G
F
E
D
C
B
A

1 2 3 4 5 6 7 8

T (1AC-4-F2AG-00010)


TUNER OUT
ANT OUT
R8 560
R11 1.1K
L4 77nH
C14 3P
R10 300
Q2 2SC3355
C12 0.001
C15 0.001
L6 14nH
R14 27
T1
R6 75
C11 0.001
R13 270
C16 2P
T2
R15 12
R5 240
R9 620
C10 4P
R12 15
C13 13P
L5 1μH
L7 0.56μ
C22 5P
C20 0.01μ
C63 5P
R16 100
L8 18nH
C21 0P
C66 1P
R60 150
VR
C105 11P
C106 0.001
L103 0.47μH
R101 2K
C103 2P
Q101 2SC3935
D51 1SS242
T51
D52 1SS242
L101
L102
C104 1P
R104 240
C64 11P
C65 4P
VC
C101 2.7P
C102 100P
R102 3K
C61 0.1μ
RF CONVERTER

T (1AC-4-F2AG-00020)

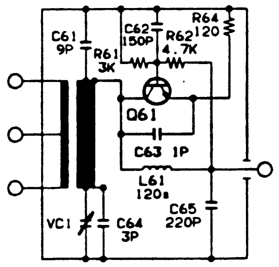

C56 0.01μ
TUNER OUT
R57 10
R58 180
R44 12
ANT OUT
L36 1μ
L34 0.68μ
L33
C41 0.001
L37
R42 27
T22
C40 4P
R41 270
C42 1P
C20 4P
R40 13
L2
R10 82
C16 0.001
0.01μ
C7 10P
R8 330
D2
R9 150
R7 2.7K
OSC. BLOCK
D3
R6 5.6K
C18 100P
C17 100P
RF CONVERTER

NOTE

IC1 : AJ7080

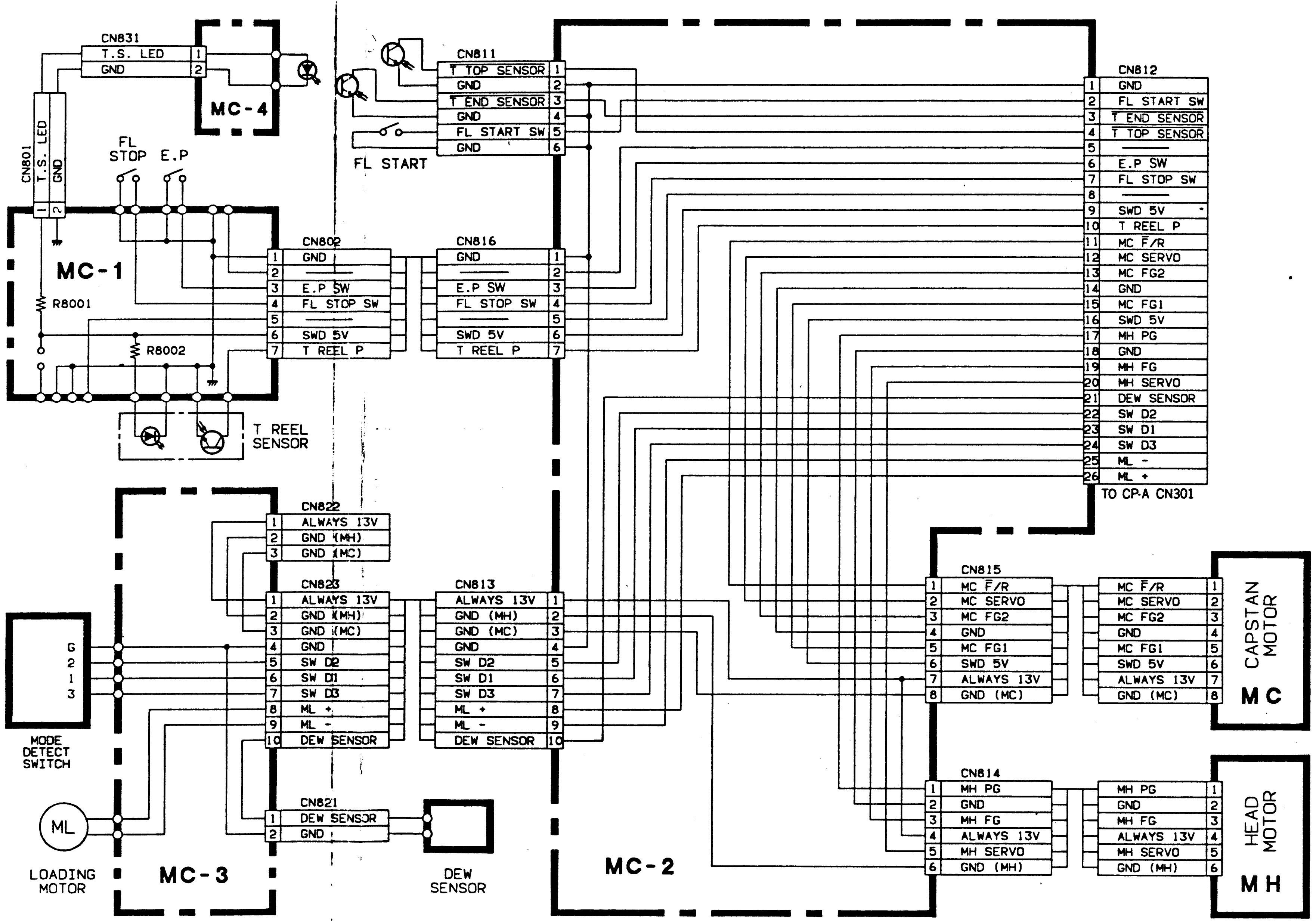
Q61 : 2SC2480 OR EQUIVALENT
D2.D3 : HSM276 OR EQUIVALENT
D31 : 1SS133.1SS83 OR EQUIVALENT

OSC BLOCK


C61 9P
C62 150P
R64 120
R62 4.7K
R61 3K
Q61
C63 1P
L61 120n
C65 220P
VC1
C64 3P
+B

H

## MECHANISM CONNECTION CIRCUIT (1AC-0-B11A-00100)


CN831
1 T.S. LED
2 GND
MC-4
CN811
1 T TOP SENSOR
2 GND
3 T END SENSOR
4 GND
5 FL START SW
6 GND
FL START
CN801
1 T.S. LED
2 GND
FL STOP
E.P
MC-1
R8001
R8002
T REEL SENSOR
CN802
1 GND
2
3 E.P SW
4 FL STOP SW
5
6 SWD 5V
7 T REEL P
CN816
1 GND
2
3 E.P SW
4 FL STOP SW
5
6 SWD 5V
7 T REEL P
CN812
1 GND
2 FL START SW
3 T END SENSOR
4 T TOP SENSOR
5
6 E.P SW
7 FL STOP SW
8
9 SWD 5V
10 T REEL P
11 MC F̄/R
12 MC SERVO
13 MC FG2
14 GND
15 MC FG1
16 SWD 5V
17 MH PG
18 GND
19 MH FG
20 MH SERVO
21 DEW SENSOR
22 SW D2
23 SW D1
24 SW D3
25 ML -
26 ML +
TO CP-A CN301
CN822
1 ALWAYS 13V
2 GND (MH)
3 GND (MC)
CN823
1 ALWAYS 13V
2 GND (MH)
3 GND (MC)
4 GND
5 SW D2
6 SW D1
7 SW D3
8 ML +
9 ML -
10 DEW SENSOR
CN813
1 ALWAYS 13V
2 GND (MH)
3 GND (MC)
4 GND
5 SW D2
6 SW D1
7 SW D3
8 ML +
9 ML -
10 DEW SENSOR
G
2
1
3
MODE DETECT SWITCH
MC-3
ML
LOADING MOTOR
CN821
1 DEW SENSOR
2 GND
DEW SENSOR
MC-2
CN815
1 MC F̄/R
2 MC SERVO
3 MC FG2
4 GND
5 MC FG1
6 SWD 5V
7 ALWAYS 13V
8 GND (MC)
MC F̄/R 1
MC SERVO 2
MC FG2 3
GND 4
MC FG1 5
SWD 5V 6
ALWAYS 13V 7
GND (MC) 8
CAPSTAN MOTOR
MC
CN814
1 MH PG
2 GND
3 MH FG
4 ALWAYS 13V
5 MH SERVO
6 GND (MH)
MH PG 1
GND 2
MH FG 3
ALWAYS 13V 4
MH SERVO 5
GND (MH) 6
HEAD MOTOR
MH

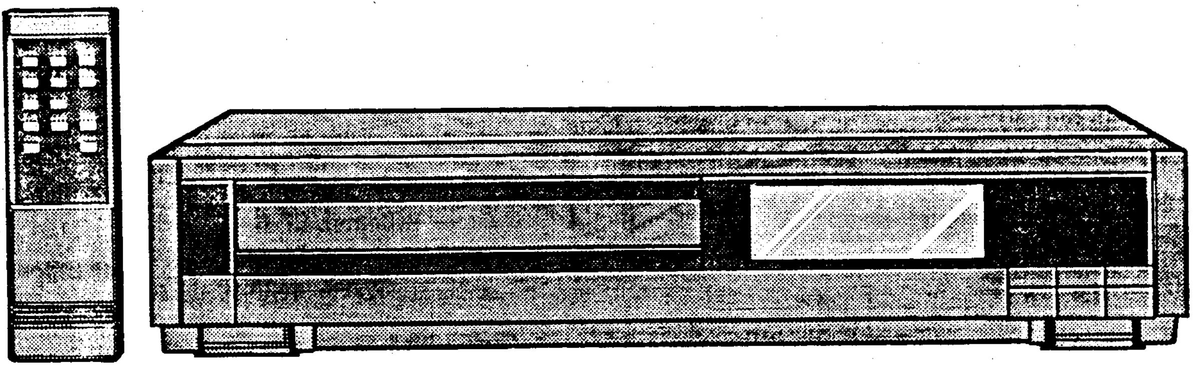
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

SANYO

**Service Manual**

# Colour Video Cassette Recorder

# VHR-4100 Series



VHR-4100EX

VHS PAL HQ

## Table of Contents

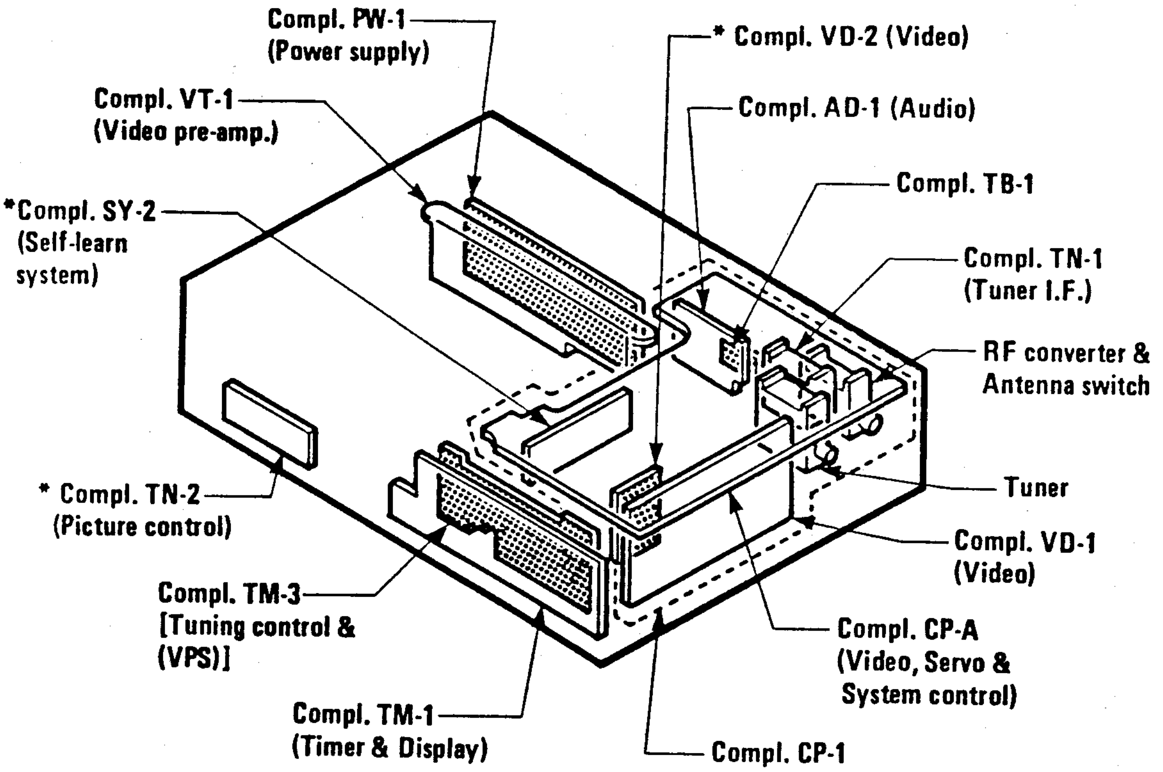
1. LOCATION OF THE MAIN BOARDS . . . . . . . . . . . . . . 1
2. ELECTRICAL ADJUSTMENTS . . . . . . . . . . . . . . . . 1 ~ 7

DP1/DP1L/DP2/DP2L Series

REFERENCE NO. WM-2234

# 1. LOCATION OF THE MAIN BOARDS

Compl. = Complete


Compl. PW-1
(Power supply)
Compl. VT-1
(Video pre-amp.)
*Compl. SY-2
(Self-learn
system)
* Compl. TN-2
(Picture control)
Compl. TM-3
[Tuning control &
(VPS)]
Compl. TM-1
(Timer & Display)
* Compl. VD-2 (Video)
Compl. AD-1 (Audio)
Compl. TB-1
Compl. TN-1
(Tuner I.F.)
RF converter &
Antenna switch
Tuner
Compl. VD-1
(Video)
Compl. CP-A
(Video, Servo &
System control)
Compl. CP-1

* NOTE (1) : Compl. SY-2 and Compl. TN-2 are attached to the VHR-4300 series and VHR-4350 series models.

* NOTE (2) : Compl. VD-2 is attached to the VHR-4100 EX/EV/G/EE, VHR-4150EX/EV/G/EE, VHR-4300EX/EV/G/EE and VHR-4350EX/EV/G/EE models.

# 2. ELECTRICAL ADJUSTMENTS

## 2-1. PREPARATIONS

### 2-1-1. EQUIPMENTS

- Colour TV monitor
- Colour-bar generator (with RF and LINE OUTPUT)
- Audio frequency oscillator
- Attenuator
- Oscilloscope (dual trace; frequency response: 10MHz or more; probe: 10:1)
- Frequency counter (countable to 10MHz or higher)
- Digital voltmeter
- Alignment cassette (VHJ-0008) Colour bar 1KHz
- Alignment cassette (VHJ-0009) Monoscope 6KHz
- Alignment cassette (VHJ-0051) Check for D.O.C.
- Alignment cassette (VHJ-0023) PAL Monoscope 6KHz, PAL Colour-bar 1KHz, SECAM Colour-bar 1KHz, PAL RF Sweep MESECAM Colour-bar 1KHz, NTSC Colour-bar 1KHz.
- AC voltmeter
- In/output probes

### 2-1-2. SET-UP

Because the RF input signal is used for adjustment of circuits, connect the colour-bar generator to the ANT IN terminal of the VCR. The RF input signal is processed by the tuner and IF circuit. It is important that the video output signal of the IF circuit satisfy the items shown in figure. Connect the oscilloscope to the VIDEO OUTPUT terminal of the video circuit, and then check the video output signal.

- The amplitude of the sync signal should be approximately 0.3Vp-p.
- The amplitude of the video signal should be approximately 0.7Vp-p.
- While observing the oscilloscope or TV screen, make fine-tuning adjustments so that the colour burst amplitude is approximately 0.3Vp-p.
- Check to be sure that there is no spike noise in the sync part of the horizontal sync signal.

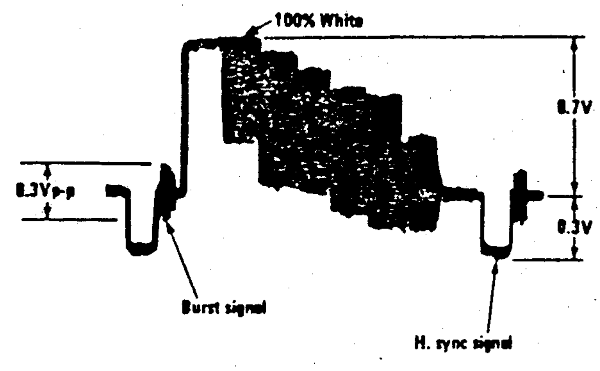
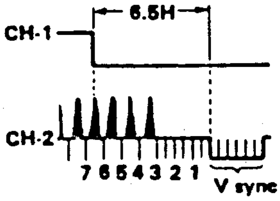
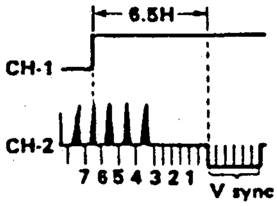
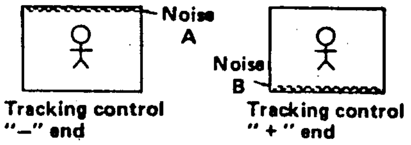


Fig. 2-2-1

## 2-2. SERVO CIRCUIT ADJUSTMENT ... Compl. CP-A

NOTE: Adjustment No. 4 is unnecessary for VHR-4100 series, VHR-4150 series and VHR-4350 series.

| No. | Item | Input | Mode | Point | Location | Remark |
|---|---|---|---|---|---|---|
| 1 | CH-1 SWITCHING POSITION | Alignment cassette (VHJ-0009 or VHJ-0023) | PLAY | TP161 or CN161⑲<br>CN359①<br>(trigger) | VR351 | <br> <br>1. Set the tracking control to the center position (on the display).<br>2. Adjust VR351 so that the phase of the leading edge of the vertical sync signal is delayed 6.5 ±0.5H from the fall of the CH-1 waveform. |
| 2 | CH-2 SWITCHING POSITION | Alignment cassette (VHJ-0009 or VHJ-0023) | PLAY | ·TP161 or CN161⑲<br>CN359①<br>(trigger) | VR351 | <br> <br>1. Set the tracking control to the center position.<br>2. Check that the phase of the leading edge of the vertical sync signal is delayed 6.5 ±0.5H from the rise of the CH-1 waveform.<br>3. If the phase difference is more than 0.5H, readjust VR351 to satisfactory value at CH-1 and CH-2. |

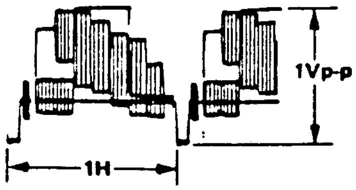
| No. | Item | Input | Mode | Point | Location | Remark |
|---|---|---|---|---|---|---|
| 3 | STILL V-LOCK | Colour bar from Colour bar generator | REC<br>↓<br>PLAY<br>↓<br>STILL | TV screen | VR851<br>(Compl. TB-1) | 1. Playback the recorded part, and put the VCR in the STILL mode.<br>2. Adjust VR851 so that the V jitter (very fine movement of the vertical sync) is minimized. |
| 4 | SLOW TRACKING (VHR-4300 series only) | Colour bar from Colour bar generator | REC<br>↓<br>PLAY<br>↓<br>SLOW | TV screen | VR362 |   Noise A<br>Noise B<br>Tracking control "–" end<br>Tracking control "+" end<br>1. Put the VCR in the REC mode (SP mode). (record at the middle of the cassette tape).<br>2. Playback the recorded part, and VCR in the SLOW mode by remote control.<br>3. Set the tracking control to the center position (on the display).<br>4. Turn VR362, and move the noise out of the TV screen, while watching to the screen.<br>5. The noise position at which noise begins to appear at the upper edge of the TV screen is A, when the tracking control to the "–" end.<br>6. The noise position at which noise begins to appear at the lower edge of the TV screen is B, when the tracking control to the "+" end.<br>7. Readjust VR362 so that the same level of noise A and noise B. |

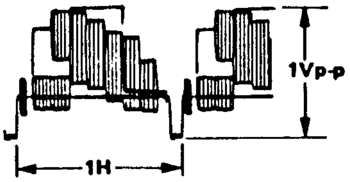
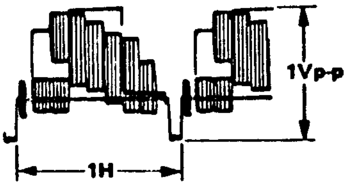
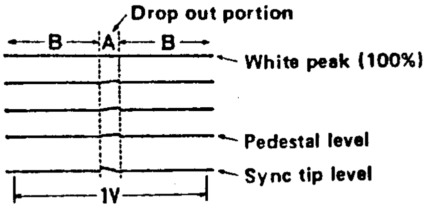
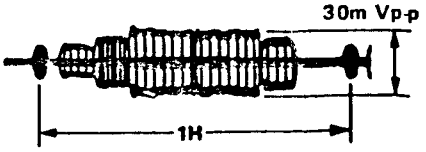
## 2-3. VIDEO CIRCUIT ADJUSTMENT ... Compl. VD-1 and Compl. VP-1

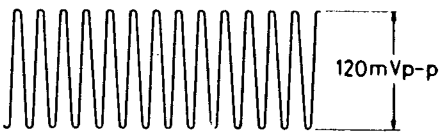
NOTE (1): When adjusting No. 1, No. 3 and No. 4 terminate VIDEO OUTPUT terminal (CN161 pin 19 or RCA terminal) at 75 ohms.

(2): To make this adjustment, alternately make the adjustments described in No. 2 and No. 3 below. Repeat this procedure until both adjustment values are satisfied.

(3): No-signal E-E mode is do not supply any signal to VIDEO INPUT terminal.

| No. | Item | Input | Mode | Point | Location | Remark |
|---|---|---|---|---|---|---|
| 1 | E-E LEVEL | Colour bar from Colour bar generator | E-E | TP161<br>or<br>CN161 ⑲<br>(Compl. CP-A) | VR104 |  <br>Adjust VR104 so that the level is 1.00 ±0.05 Vp-p. |

| No. | Item | Input | Mode | Point | Location | Remark |
|---|---|---|---|---|---|---|
| 2 | CARRIER SET | None | REC | TP102<br>or<br>TP162<br>(Compl. CP-A) | VR101 | 1. Set the channel selector button to the "AV" position and put the VCR in the no-signal mode.<br>2. Adjust VR101 so that the frequency is 3.80 ±0.05 MHz. |
| 3 | DEVIATION | Colour bar from Colour bar generator | REC (Adjustment)<br>⬇<br>PLAY (Check) | TP102<br>or<br>TP162<br>(Compl. CP-A) | VR102 |  <br>1. Playback the recorded part, and check that the level is 1.00 ±0.05 Vp-p.<br>2. If the level is not 1.00 ±0.05 Vp-p, adjust VR102, record and playback it until the value is satisfied. |
| 4 | PLAYBACK LEVEL | Alignment cassette (VHJ-0008 or VHJ-0023) | PLAY (Colour bar) | TP161<br>or<br>CN161 ⑲<br>(Compl. CP-A) | VR103 |  <br>Adjust VR103 so that the level is 1.00 ±0.05 Vp-p. |
| 5 | VXO | Brank tape | PLAY | TP163<br>(Compl. CP-A) | VR121 | Adjust VR121 so that the frequency is 4433619 ±20Hz. |
| 6 | CCD LEVEL | Alignment cassette (VHJ-0051) | PLAY | TP161<br>or<br>CN161 ⑲<br>(Compl. CP-A) | VR111 |  Drop out portion<br>B<br>A<br>B<br>White peak (100%)<br>Pedestal level<br>Sync tip level<br>1V<br>1. Set the horizontal scale of oscilloscope is 1 msec./div., and measuring with vertical period.<br>2. Adjust VR111 so that the drop out portion "A" of white peak (100%) and other portion "B" is same level. |
| 7 | CHROMINANCE SIGNAL RECORDING CURRENT | Colour bar from Colour bar generator | REC | CN183② (HOT)<br>CN183① (GND)<br>(Compl. VP-1) | VR182 |  <br>1. Turn VR181 all the way to the right, looking from the parts side.<br>2. Adjust VR182 so that the level is 30 ±2m Vp-p. |

| No. | Item | Input | Mode | Point | Location | Remark |
|---|---|---|---|---|---|---|
| 8 | LUMINANCE SIGNAL RECORDING CURRENT | None | REC | CN183②<br>(HOT)<br>CN183①<br>(GND)<br>(Compl. VP-1) | VR181 |  <br>1. Set the channel selector button to the "AV" position and put the VCR in the no-signal stop mode.<br>2. Adjust VR181 so that the level is 120 ±5m Vp-p. |

## 2-4. AUDIO CIRCUIT ADJUSTMENT ... Compl. AD-1

NOTE (1): The VR201 and VR202 (on the Compl. AD-1) are able to adjust from the foil side of Compl. CP-A. (see Fig. 2-6-1)

NOTE (2): No-signal record mode is do not supply and signal to AUDIO INPUT terminal.

NOTE (3): Adjustment of No. 2 for the unit which used RCA pin jack for the audio output on the rear terminal board is not necessary.

NOTE (4): Adjustment of No. 3 for the unit which used 21 pin SCART for the audio output on the rear terminal board is not necessary.

| No. | Item | Input | Mode | Point | Location | Remark |
|---|---|---|---|---|---|---|
| 1 | BIAS | None | REC | JP212<br>JP211<br>(GND)<br>(Compl. CP-A) | VR201 | 1. Set the channel selector button to "AV" position and put the VCR in the no-signal record mode.<br>2. Adjust VR201 so that the level is 24mVrms. |
| 2 | PLAYBACK OUTPUT LEVEL NOTE (3) | Audio signal (1 KHz, –3.8 dBs) from Audio signal generator | REC<br>⬇<br>PLAY | AUDIO OUT terminal CN161① | VR202 | Adjust VR202 so that the recorded 1 kHz output level becomes –3.8 dBs in the PLAY mode. |
| 3 | PLAYBACK OUTPUT LEVEL NOTE (4) | Audio signal (1 KHz, –20 dBs) from Audio signal generator | REC<br>⬇<br>PLAY | AUDIO OUT terminal | VR202 | Adjust VR202 so that the recorded 1 KHz output level becomes –8 dBs in the PLAY mode. |

## 2-5. TUNER IF CIRCUIT ADJUSTMENT ... Compl. TN-1

| No. | Item | Input | Mode | Point | Location | Remark |
|---|---|---|---|---|---|---|
| 1 | RF AGC | TV broadcast | E-E | TV screen | VR6101 | 1. Remove the rear terminal board from Compl. CP-A. (see Fig. 2-6-1)<br>2. Turn VR6101 in the direction which causes snow to appear, then in the opposite direction until the snow just disappears. |

## 2-6. TEST POINT & ADJUSTMENT LOCATION

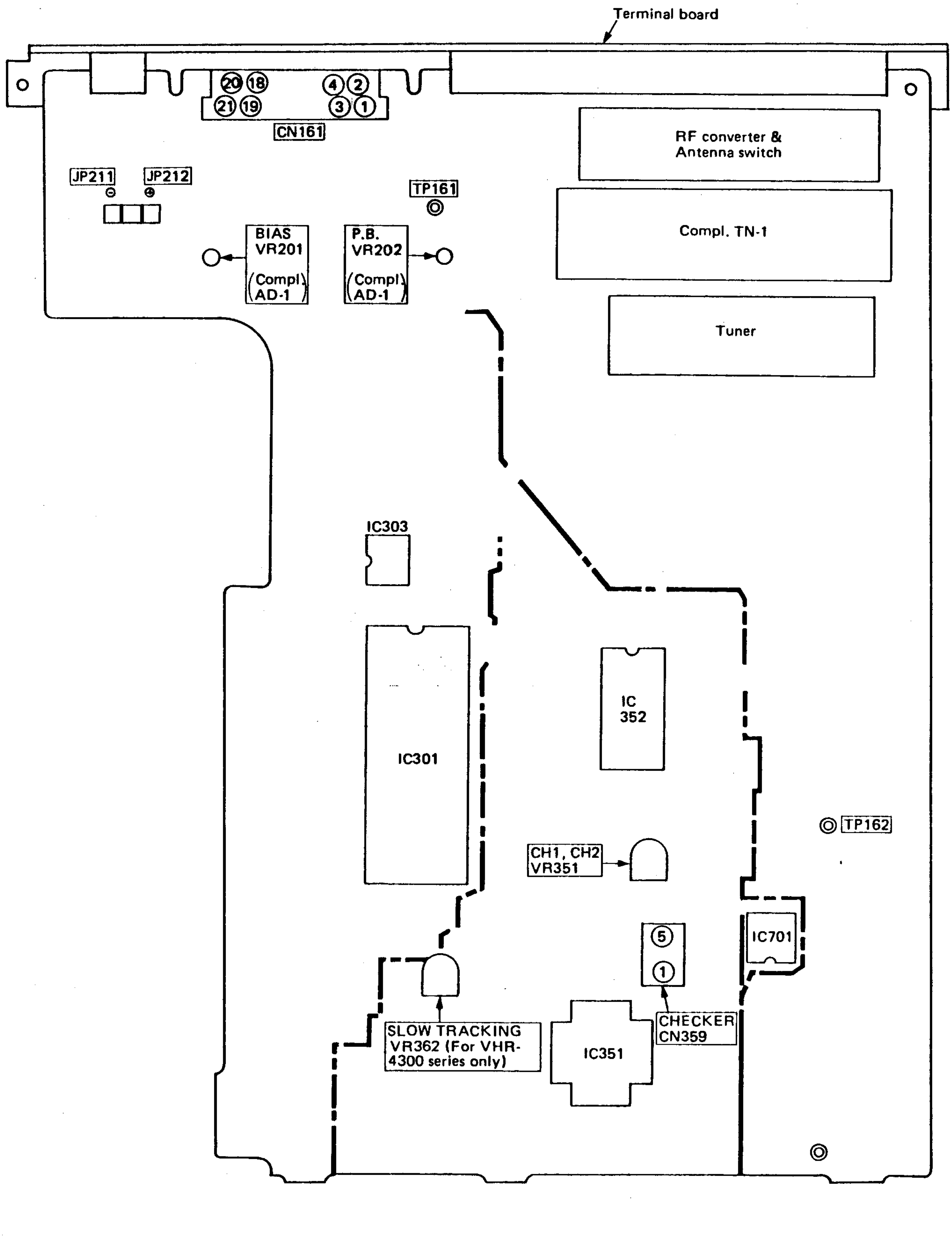

Terminal board
⑳ ⑱ ④ ②
㉑ ⑲ ③ ①
CN161
RF converter & Antenna switch
JP211
JP212
⊖
⊕
TP161
Compl. TN-1
BIAS VR201 (Compl AD-1)
P.B. VR202 (Compl AD-1)
Tuner
IC303
IC301
IC 352
TP162
CH1, CH2 VR351
⑤
①
IC701
SLOW TRACKING VR362 (For VHR-4300 series only)
IC351
CHECKER CN359

Fig. 2-6-1 Compl. CP-A (Foil side view)

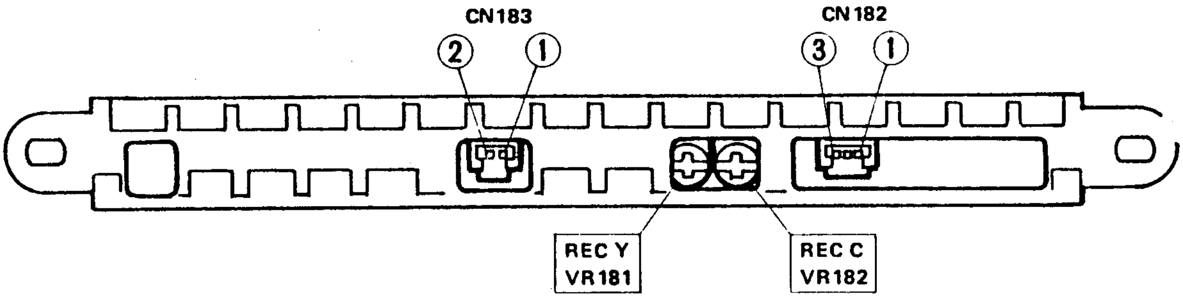

CN183
②
①
CN182
③
①
REC Y
VR181
REC C
VR182

Fig. 2-6-2 Compl. VP-1

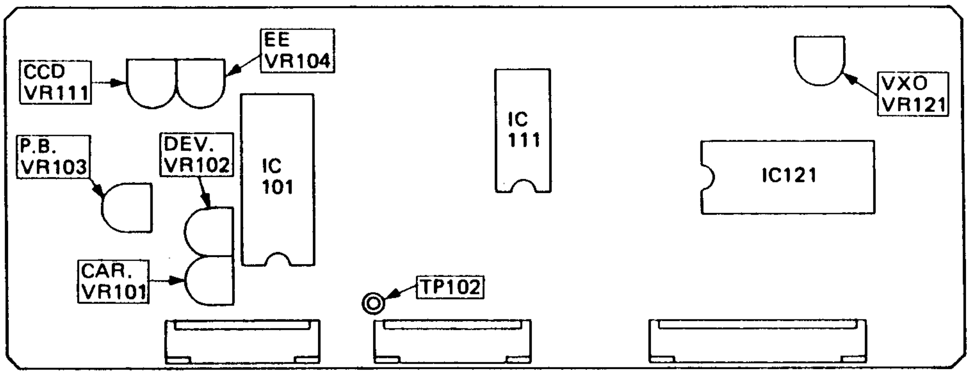

EE
VR104
CCD
VR111
P.B.
VR103
DEV.
VR102
IC
101
IC
111
VXO
VR121
IC121
CAR.
VR101
TP102

Fig. 2-6-3 Compl. VD-1 (Foil side view)

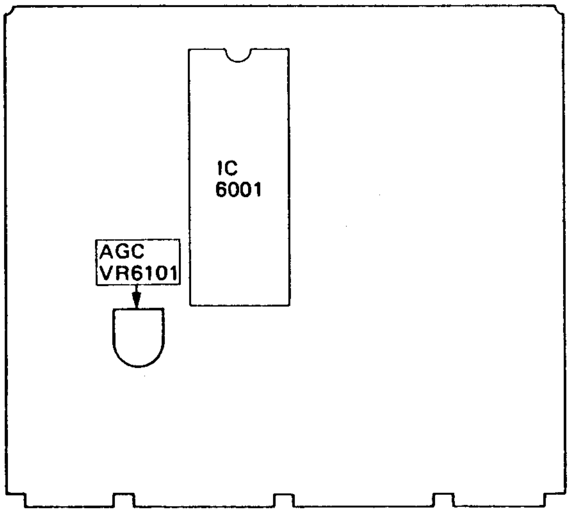

IC
6001
AGC
VR6101

Fig. 2-6-4 Compl. TN-1 (Parts side view)

SANYO Electric Co., Ltd.
Osaka, Japan

A11300 Apr./'88/6000 HA Printed in Japan